The Metals REVIEW

OWNED AND PUBLISHED BY THE MEMBERS OF THE AMERICAN SOCIETY FOR METALS

THE MONTHLY SURVEY AND DIGEST OF WHAT'S NEW IN METALS

Volume XVIII | NOVEMBER, 1945 | Number 11

Hotels Deluged With Show Reservations But Housing Assured

Announcement of the National Metal Congress to 28,000 members of the American Society for Metals and the American Welding Society resulted in an enthusiastic deluge of hotel reservations for the week of Feb. 4 in Cleveland. Apparently a large percentage of the members of the American Society for Metals and the American Welding Society are desirous of attending the convention because within two days' time the entire 3000 rooms allocated by the Cleveland hotels had been over-subscribed.

The Cleveland hotels are cooperating in a splendid manner and have to date allocated more rooms for the Metal Congress than they allocated in any previous convention the ASM has held in Cleveland. There is some possibility that two hotels now under the control of the Navy may be released by the time of the convention although there is no assurance of this.

Any member of the ASM who was unsuccessful in securing a hotel room and wishes to attend the Congress and Exposition should read the announcement relative to housing accommodations in Cleveland, which is printed on page 7 of this issue.

The Program Committee has taken into consideration the tight hotel situation in Cleveland, and consequently arranged the program so that it will be possible for a member to come to Cleveland for the first part of the week and attend all the technical programs and still have a large amount of time for the exposition. Those who are more interested in the educational series can come on Thursday and Friday; the schedule of these lectures is also arranged so that the attendants will have adequate time for a study of the exhibits. The complete program will be found on page 6 of this issue.

Eagerness of the exhibitors to participate in the exhibition has been keen and 315 exhibitors have taken 185,000 of the available 190,000 sq. ft. Attendance will by all odds be the largest that the Metal Congress and Exposition has ever experienced.

New Chapter in Terre Haute Elects Officers

Officers of the newest chapter of the American Society for Metals in Terre Haute, Ind., are shown in the photograph. Left to right, seated, are M. E. Hansell, secretary; Lawrence E. Simpson, chairman; Kenneth E. Hazledine, vice-chairman; and Kenneth Vran, treasurer. Standing in back row are William R. Huff, Ed Tetzel, and H. V. Fairbanks, members of the Executive Committee. In the inset at left is Stephen Reynolds and in the upper right-hand inset is Arthur W. Lindholm, also members of the Executive Committee. Carl Wirth, another member of the Executive Committee, was unable to be present. A report of the installation meeting of the new chapter is published on page 2 of this issue.

Payson Lectures on TTT-Curves

Reported by A. E. Thurber
Technical Supervisor, Oneida, Ltd.

Transformation-Temperature-Time curves as guides to the various heat treatments of steel were elucidated by Peter Payson, assistant director of research, Crucible Steel Co. of America, before the Syracuse Chapter ASM.

Mr. Payson expressed his preference for the term TTT-curves rather than S-curves since not all these curves are S-shaped. Accompanying lantern slides showed TTT-curves for a variety of steels and heat treatments. These curves explain many of the procedures that heat treaters have practiced for some time and also furnish information for future development in heat treating science.

LAST MONTH in the METAL INDUSTRY

Products and Processes

PREHEATED AIR facilitates combustion in a unique crucible draw furnace, resulting in a saving of 20% in natural gas and a correspondingly greater saving where fuel oil is used. See New Products, Item R346.

HARDNESS TESTER for large and cumbersome parts is extremely versatile, giving Rockwell readings, using either diamond or steel ball penetrator, on parts ranging from ½ to 26 in. Item R351.

HIGH TEMPERATURE FANS made of heat resistant alloy for furnaces where temperatures are as high as 1800° F. are constructed without use of screws, bolts, rivets, and welds, thus avoiding distortion and unbalancing of fan wheel. Item R340.

OXY-ACETYLENE CUTTING BLOWPIPE, especially developed for heavy duty, cuts steel ranging in thickness from 16 to 50 in. quickly and economically. See Item R344.

FATIGUE TESTING MACHINE provides a dynamic load application of 20,000 lb. in one direction by means of a static pre-loading attachment; operating speed is 2000 load cycles per min. Item R334.

CENTRALIZED LUBRICATING SYSTEM delivers measured amounts of oil or grease from a central supply unit to the farthest bearing surfaces, at any predetermined interval. See Manufacturers' Catalogs, Item R366.

Required Reading

S-CURVES are indexed for 190 analyses and typical curves and tables of thermal data are given which the metallurgist or heat treater can use to draw his own diagram with reasonable accuracy. See Review of Metal Literature, Section 18 on Heat Treatment, Item 18-240.

ELECTRO-TIN as an undercoating for cadmium deposits considerably improves the protective effect of the coating; its superior throwing power reaches recesses of intricately shaped components. Section 8, Electroplating, Item 8-120.

ELECTRICAL CONDUCTIVITY can be used for indirect determination of hardness of cold-aged aluminum alloys, as well as for identification of treatment and classification of alloys. Section 9 on Testing, Item 9-118.

LOW TEMPERATURE BEHAVIOR of NE steels is as good as that of SAE steels provided an equally fine-grained, equally hardenable steel is used. Section 8 on Properties of Metals and Alloys, Item 3-195.

SALT BATHS for patenting of steel wire heated by direct resistance using the molten salt as the resistor showed good results in Germany. Section 18 on Heat Treatment, Item 18-255.

NEW SINTERED IRON developed for magnetic parts; coercive force and maximum permeability plotted. Section 5 on Powder Metallurgy, Item 5-50.

PRECISION COLD STRIP MILL employs adjustable casters rather than backing rolls for precision rolling strip 50 in. wide. Section 19 on Working, Item 19-300.

WITTER OR CROSS-ROLL PROCESS for producing shell forgings and the SPINNING PROCESS for producing bomb bodies from seamless tubes revolutionized manufacture of shells and bombs. Section 19 on Working, Item 19-302.

METAL MOLD CASTINGS, including permanent mold castings, die castings and centrifugal castings, should be considered for every part where production is high, since properties are better, although tool cost is higher, than for sand castings. Section 14 on Foundry Practice, Item 14-320.

Notable Lectures

FOREIGN METALLURGY is reviewed by three noted scientists recently returned from abroad. Dr. Bates finds Nazi research lagging well behind our own—with one exception (page 3) but thinks that it should not be prohibited (page 4); Dr. Mehl thinks Russian competition in science is serious (page 5); and Dr. MacKenzie gives a vivid description of damage done to German industry (page 2).

COLORED MICROGRAPHS obtained by means of polarized light are demonstrated by B. L. McCarthy; constituents can be readily identified at relatively low magnifications. (Page 4.)

CENTRIFUGAL CASTING develops higher strength with better elongation than gravity sand casting, Edens' tensile tests show. (Page 3.)

GLEN RIEGEL breaks wartime silence to give examples of metal failures. There is almost always a remedy, he claims, and it is the metallurgist's responsibilty to find it. (Page 7.)

PASS-A-ROUND

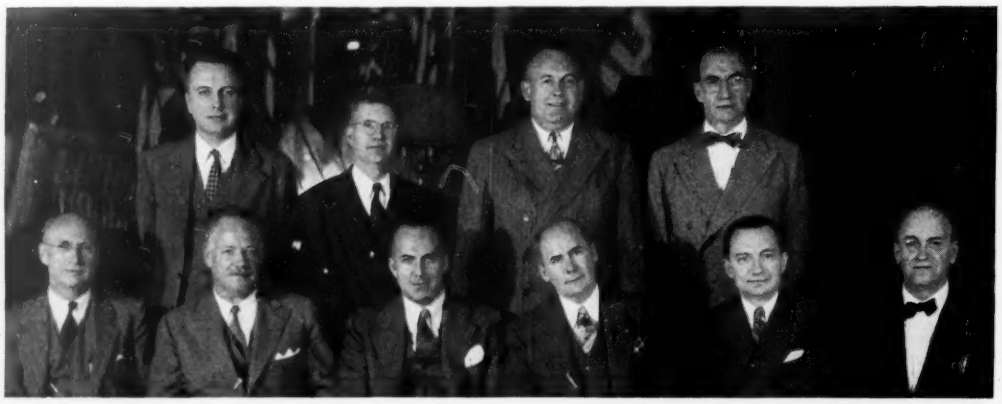
Many executives in your plant will want to see this record of what happened last month in the metal industry. Just fill in the names, note items for special attention — and Pass-A-Round.

Name	Item No.

WHERE TO FIND

Review of Current Metal Literature

New Jersey Host to National Officers



Reported by F. P. Kristufek
United States Steel Corp. Research Laboratory

Shown at National Officers' Night of the New Jersey Chapter ASM are (front row, left to right): H. D. McKinney, national treasurer and a past chairman of the Chapter, who presented a coffee talk; National Secretary W. H. Eisenman; President Kent R. Van Horn, who gave the main talk of the evening on "Radiography of Metals"; Chapter Chairman D. A. Butler; V. N. Krivobok, who also presented a coffee talk; and S. Skowronski, a past chapter chairman. Shown in the back row are K. B. Baker, who acted as technical chairman of the meeting; T. G. Gilley, Chapter secretary; R. W. Thorne, Chapter treasurer; and W. L. Hults, vice-chairman of the Chapter.

For housing reservations for 27th National Metal Congress and Exposition, see coupon on page 7.

MacKenzie Reports on German Industrial Conditions

Reported by J. C. Harvey
Tennessee Coal, Iron and Railroad Co.

A vivid picture of the awful devastation wreaked on Germany by the Allied Air Forces was presented in the introductory remarks made by James T. MacKenzie, chief metallurgist of the American Cast Iron Pipe Co., before a large gathering of the Birmingham District Chapter.

Dr. MacKenzie, who was the first chairman and a founder of the Chapter, has recently returned from a visit to Germany where he was sent by the Allied Governments as a member of a committee to investigate industrial conditions inside postwar Germany, his function naturally being in the field of cast iron and centrifugal casting, of which he is an internationally known authority.

The damage which impressed the speaker most was the havoc done to railway marshalling yards, which the Allied Air Forces did a very thorough job of wrecking. Many factory buildings stood up fairly well; about 80% of the building itself might be destroyed but only about 20% of the machinery. However, the Krupp Works in Essen decided to go out of business last autumn after the Air Forces dropped 5,000 tons of explosives in 40 min.

The greatest shortage is coal; the Ruhr is producing only about 5 to 15% of its normal peacetime output.

Dr. MacKenzie gave a brief description of the more interesting developments observed in the field of centrifugal casting, but this part of his talk has not yet been released for publication. However, he gave the opinion that German practice in this field is inferior to ours.

Dr. MacKenzie was asked how long it would take for Germany to resume her place as an industrial nation. He replied that with plenty of assistance from this country they might do it in ten years but without assistance it would take at least 50 years.

Terre Haute Chapter Receives Charter, Installation Meeting Held Oct. 19

Reported by M. E. Hansell
Instructor, Rose Polytechnic Institute

The installation meeting of the newest chapter to be added to the list of the 66 ASM local groups through the country was held on Oct. 19 when 50 members and guests gathered to attend the second meeting of the Terre Haute Chapter. The charter was presented to the officers of the Chapter by National Secretary W. H. Eisenman, who gave a helpful talk on ASM activities.

The secretary of the Chapter then presented the chairman, Lawrence E. Simpson, with a golden (aluminum bronze) gavel. The gavel was made by the secretary, M. E. Hansell, and engraved by Arthur Lindholm, a manufacturing jeweler and a member of the Executive Committee.

ASM President Kent R. Van Horn gave the main talk of the evening on "Age Hardening of Metals".

An earlier meeting had been held by the new chapter on Sept. 28, when R. B. Seger of the Lindberg Steel Treating Co. presented a film and talk on heat treating.

Discussion of Stagg's Talk Centers on Sub-Zero Quenching

Reported by C. E. Blass
Talon, Inc.

Howard Stagg, sales metallurgist for the Crucible Steel Co. of America, delivered an address on "Tools and Their Relation to Tool Steels" before the Northwestern Pennsylvania Chapter on Sept. 27. This address was the same one he delivered to the Milwaukee Chapter on Sept. 18, reported in last month's METALS REVIEW.

In his address, he took elaborate pains to explain the importance of S-curves and their relation to interrupted quenching. The second part of his talk was then devoted to correcting common errors in tool design, intended to simplify heat treating and to insure longer tool life.

A question and answer discussion centered around sub-zero quenching. Mr. Stagg ably demonstrated the proper application of such a type of quench in transforming the last 1% or less of austenite to martensite. This is necessary for gages and certain other precision equipment, but is not of sufficient value to be used in common tools.

Seven Fundamental Factors Determine Steelmaking Quality

Reported by H. L. Millar
Metallurgist, Plomb Tool Co.

As principal speaker at the opening meeting of the Los Angeles Chapter ASM, G. L. von Planck, chief metallurgist, Columbia Steel Co., San Francisco, conducted his audience on a "behind the scenes" tour through a steel mill. A misapplication of quality steel often causes dissatisfaction among the customers, Mr. von Planck emphasized. As a result, it has become one of the functions of the metallurgical departments to translate the customer's needs and specifications into terms of steelmaking practice in order to produce quality materials to suit particular applications.

Not being a universal material, the speaker continued, steel which is suitable for one application may fail in another, although both may have the same outward appearance. Quality of steel which is reflected in name designations, such as structural quality, flanging quality, forging quality, and aircraft quality, etc., is inherent in the metal and can be controlled only during manufacture.

Basic Open-Hearth Process Outlined

Mr. von Planck outlined briefly the process of steelmaking by the basic open-hearth method and listed seven fundamental factors which determine the quality of the melt: The kind of scrap; the care taken in melting and refining; heating ingots for rolling; conditioning of billets and blooms; rolling practice of finished products; tests; and inspection.

Speaking for the combined steel industries of the United States, Mr. von Planck concluded with a statement that steel manufacturing concerns established during the war an enviable record for maximum production of high quality steel.

The "old-timers" at the meeting who had been associated with the Chapter for 20 years or more were dinner guests of M. B. Pendleton of Plomb Tool Co. Bill Farrar of Farrar Industrial Products was master of ceremonies and performed the introductions.

CHAPTER MEETING CALENDAR

CHAPTER	DATE	PLACE	SPEAKER	SUBJECT
Baltimore	Dec.			Christmas Party
Birmingham District	Dec. 4	Birmingham Heat Treating Co.	C. H. Vaughan	Practical Heat Treating
Boston	Dec. 7	Hotel Sheraton	Waldemar Naujoks	Forging
Buffalo	Dec. 13	Hotel Statler	W. D. Forgeng	Metallography
Calumet	Dec. 11	Peter Levent's, Roby, Ind.		Magic of Communications
Cedar Rapids	Dec. 11	Hotel Roosevelt	Tom C. Muff	Heat Treatment of Cast Iron
Chicago	Dec. 13	Chicago Bar Assoc.	G. A. Roberts and James P. Gill	Developments in High Speed Tool Steels
Cincinnati	Dec. 13	Engineering Society	C. H. Herty, Jr.	Steelmaking Practice as It Affects Properties of Interest to the User
Cleveland	Dec. 3	Cleveland Club	D. K. Crampton	Copper and Copper Alloys
Columbus	Dec. 11	Battelle Memorial Institute	C. H. Herty, Jr.	Steelmaking Practice as It Affects Properties of Interest to the User
Dayton	Dec. 12	Engineers Club	C. H. Herty, Jr.	Steelmaking Practice as It Affects Properties of Interest to the User
Detroit	Dec. 10			Christmas Party
Eastern New York	Dec. 4	Hotel Van Curler, Schenectady	Zay Jeffries	Silver Anniversary
Fort Wayne	Dec. 18	Chamber of Commerce	W. J. Conley	Arc Welding
Hartford	Dec. 11			
Indianapolis	Dec. 17	Canary Cottage	W. Z. Friend	Corrosion of Metals and Its Relation to Design and Service
Kansas City	Dec. 19			Christmas Party
Lehigh Valley	Dec. 7	Hotel Bethlehem	John Chipman	Steel at High Temperatures
Mahoning Valley	Dec. 11	Tod Hotel, Youngstown, Ohio	J. W. Halley	Lead-Bearing Steels
Manitoba	Dec. 13	Marlborough Hotel	G. M. Brownell	Sources of Metals
Milwaukee	Dec. 11	Athletic Club	Stephen Smith	Flame Hardening
Montreal	Dec. 3	Queen's Hotel	J. O. Almen	Shot Peening
Muncie	Dec. 11			Quality Control
New Haven	Dec. 6	Chi Psi Lodge	H. L. Burr	Electricity in Living Organisms
New Haven	Dec. 14	Hotel Clark, Derby, Conn.		Christmas Party
New Jersey	Dec. 17	Essex House, Newark		Smoker
New York	Dec. 10	Building Trades Bldg.	Fred Heinzelman, Jr.	Heat Treatment Without Distortion
Northwest Pa.	Nov. 29	Meadville, Pa.	R. W. Thomas	Tools and Their Maintenance
Notre Dame	Dec. 12	Engineering Audit., Univ. of Notre Dame	Wm. B. Stout	Imagineering in the Postwar World
Ontario	Dec. 7	Hamilton, Ont.	C. George Segeler	Recent Trends in Aluminum and Magnesium
Philadelphia	Nov. 30	Engineers Club	C. H. Herty, Jr.	Steelmaking Practice as It Affects Properties of Interest to the User
Pittsburgh	Dec. 13	Roosevelt Hotel		Christmas Party
Pueblo Group	Dec. 20	Pueblo, Colo.	L. F. Quigg	The Colorado Fuel & Iron Corp.
Rhode Island	Dec. 5		H. G. Williams	Beryllium-Copper in Postwar Product Design
Rochester	Dec. 11	Lower Strong Audit.	Ralph L. Lee	Humanics
Rockford	Dec. 19	Faust Hotel	G. A. Russ	X-Ray Examination
Rocky Mountain	Dec. 21	Denver, Colo.	L. F. Quigg	The Colorado Fuel & Iron Corp.
Springfield	Dec. 17	Sheraton Hotel		Christmas Party and Silver Anniversary Celebration
St. Louis	Nov. 29	Engineers Club		Magnesium
St. Louis	Dec. 21			Christmas Party
Syracuse	Dec. 8	Onondaga Hotel		Christmas Party
Toledo Group	Dec. 15			Christmas Party
Tulsa	Dec. 11	Public Service Audit.		Welding
Warren	Dec. 13	IOOF Hall		
West Michigan	Dec. 17		E. E. Thum	Atomic Energy
Worcester	Dec. 12	Hotel Sheraton	John Wulff	Powder Metallurgy
York	Dec. 12	West York Inn, York, Pa.	C. A. Zapffe	Gases in Metals

Symposium on Metallurgy at Philadelphia Inaugurates Temple University's Day Course

Reported by Joseph Mazia
Engineer (Chemical), Frankford Arsenal

On the Silver Anniversary of the Evening Metallurgy Course sponsored jointly by the Philadelphia Chapter and Temple University, a Day Course in Metallurgy was launched on Sept. 28. This course will permit students to obtain an A.B. in Metallurgy without leaving the city limits of Philadelphia.

The launching ceremony consisted of a full-day "Symposium on Metallurgy" at Temple with National President Van Horn and Secretary Eisenman present to bestow blessings on the venture. Six technical papers were offered in the symposium which met with the acclaim of approximately 1000 attendants.

The morning session was sponsored by the Temple University Metallurgical Alumni Association and covered "New Developments in Quality Control". This program consisted of four papers which clearly demonstrated that the statistical approach to production problems of quality check and inspection is here to stay. Titles and authors of the papers—all on "Quality Control"—were:

"As Applied to Steel Manufacture and Working of Steel", by A. O. Schaefer, executive metallurgical engineer, The Midvale Co.

"As Applied to Welding and Welding Construction", by A. J. Raymo, superintendent of welding shop, Baldwin Locomotive Works.

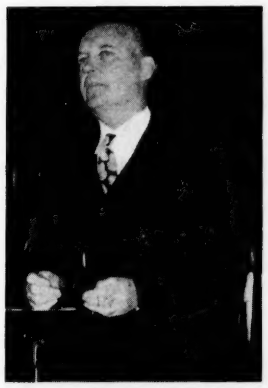
"As Applied to Finished Parts Fabrication", by G. W. Schorr, chief inspector, SKF Industries.

"As Applied to Mass Production of Finished Parts", by Charles Scott, general quality supervisor for all plants, SKF Industries.

Foley Discusses Sigma Phase

In the afternoon session Francis B. Foley, director of research of the Midvale Co., presented his paper on "The Sigma Phase of High Chromium-Nickel Alloys".

Iron-nickel-chromium alloys for high temperature applications, particularly in the gas turbine field, have brought into the foreground of metallurgy the importance of sigma phase, Mr. Foley pointed out. Metallurgists brought up with an understanding of the alpha and gamma phases must now understand the significance of hard and brittle sigma which causes tensile failures that appear in the elevated temperature range. By tracing the history of sigma phase investigations and presenting a compilation of the most important data obtained in recent studies, Foley made a significant contribution to the field of high temperature metallurgy, particularly that involved in jet propulsion and the gas turbine field in general.



F. B. Foley

This session was under the chairmanship of Norman L. Mochel. Subsequent discussion by A. Allan Bates, Russell Franks, Peter Payson and C. T. Evans added considerably to the subject matter.

Electron Microscope Described

R. G. Picard's dissertation on "The Electron Microscope and its Application to the Study of Metals" highlighted the evening session. Dr. Picard, advanced development engineer of RCA, explained in terms familiar to the layman the value of the electron microscope as a tool of metallurgical science.

The instrument was described as simply a vacuum tube with a cathode source of electrons which are collimated and magnified by a series of electro-magnetic lenses. The electron beam penetrates the specimen (or replica of a specimen) and is made visible by use of a fluorescent screen. A photograph may be made on a conventional silver emulsion.

A hundred-fold gain is realized in resolution over the light microscope which means that real magnifications of 100,000 diameters are easily obtainable with significant results. The modern research and console models of electron microscopes were described and illustrated in lantern slides. Electron micrographs were projected on the screen which the audience viewed through polarized lenses, giving a three-dimensional picture at 100,000 magnifications.

New Company Formed for Stainless Sheet

Formation of the Washington Steel Corp. in Washington, Pa., a new company that will produce stainless steel in both sheet and strip form has been announced. T. S. Fitch, formerly manager of the composite steel division of the Jessop Steel Co., Washington, Pa., is president, and F. G. Gerard, formerly plant superintendent of the Eastern Rolling Mill Co., Baltimore, is vice-president in charge of operations.

The new corporation has purchased the plant and facilities formerly owned by the Washington Tin Plate Co. and will install new machinery to handle stainless steel.

Charles H. Herty, Jr., national president ASM, presents a certificate commemorating 25 years of educational activities to L. E. Ekholm, chairman of the Philadelphia Chapter.

High Carbon, High Chromium Advocated for Die Steels

Reported by Henry Hauseman
Metallurgist, LaPlant-Choate Mfg. Co., Inc.

Tungsten-molybdenum high speed steels are equal in performance to the regular 18-4-1 type, A. J. Scheid, chief metallurgist of the Columbia Tool Steel Co., stated in discussing the "Principal Types of Tool Steel and Their Adaptability to Present-Day Requirements" at the September meeting of the Cedar Rapids Chapter.

High carbon, high chromium steels, according to Mr. Scheid, are able to out-produce the other die steels four to one, and he stated that they will assume a major role in the immediate postwar period. These steels are useful for an exceptionally wide range of die work, including blanking, pointing, forming, lamination, shaving, and thread-rolling dies. In addition they are very useful steels for broaches, reamers, gages, beading and edging rolls and many other tools of this type. These steels, he said, will out-wear all of the other die steels. They are easy to harden and are subject to less dimensional change during heat treatment than many of the other die steels.

Improper heat treatment was credited as the cause of about 75% of the tool steel failures. To insure that tools have the maximum strength possible for the type, along with a minimum of dimensional change, proper hardening and tempering temperatures must be used. Tools that fail to harden should not be thrown back into the furnace for re-hardening before the source of the trouble is located. Usually a close inspection of all of the working conditions will disclose the cause of low hardness values.

Mr. Scheid also discussed the TTT-curves of the water hardening and oil hardening tool steels. Referring to these curves, he pointed out the critical temperature range occurring in the quench and emphasized the importance of quenching speed down to the "M" point, and the use of delayed cooling at the "M" point.

Surface finish is exceedingly important in lengthening tool life, according to Mr. Scheid. The speaker suggested that the usual finish grind with a 60-mesh wheel be followed by an additional finish grind with a number 320 grit wheel, removing from 0.0005 to 0.001 in. In specific instances tool life can be further enhanced by chromium plating or nitriding.

Prior to Mr. Scheid's talk, Columbia Tool Steel Co.'s color film on "The Manufacture of Tool Steel" was shown.

The coffee speaker was the Rev. W. W. Argow, pastor of the Peoples Church, and chairman of the Cedar Rapids Radio Council, who spoke on "Radio News".

Simplicity of Radiography as Used In Practical Production Stressed

Reported by F. R. Anderson
Chief Metallurgist, Gardner-Denver Co.

K. R. Van Horn completely and effectively presented the case of "X-Rays in Industry" at the September meetings of the Rocky Mountain Chapter. The simplicity of application of radiography in practical production control was the keynote of his talk. The not-so-simple phase of X-rays as applied to diffraction studies was also clearly presented.

Secretary Bill Eisenman reminisced on some of the good work done by ASM during the busy and difficult war years. The activities of the Society in assisting veterans returning to work in the metal field, by means of educational programs, "refresher courses", and consultations, were stressed.

The prospect of a long convalescence from a recent illness caused Bruce LaFollette, recently elected Chapter chairman, to ask for acceptance of his resignation from that office. By a unanimous vote of the membership it was decided instead to retain Mr. LaFollette as vice-chairman and elect R. Wayne Parcel as chairman for the current year.

Atomic Power Said to Eliminate Need For Peacetime Army

Reported by Lawrence Jacobsmeyer
General Manager, Salkover Metal Processing Co.

Atomic power, no mystery to Nazi scientists but denied the Wehrmacht by devastating Allied air bombardment of industry, eliminates the need for a peacetime conscript army, A. Allan Bates, who served in Germany with an Army "scientific commando" unit, declared before the Chicago Chapter's September meeting.

Dr. Bates, who is manager of the chemical and metallurgical department of the Westinghouse Electric Corp. Research Laboratories, asserted that large sums of money spent for peacetime conscription would be worse than wasted. Such expenditures, he said, would make it vastly more difficult to obtain the substantial sums required for vital military research—and the next war will be fought with weapons developed in research laboratories rather than by great armies of men.

Dr. Bates expressed the belief that no other country was close to harnessing atomic power at the time our forces dropped atomic bombs on Japan, but was firm in his conviction that other nations can and will discover its secrets in the near future.

Dr. Bates toured France and Germany as a member of a picked group of 30 scientists connected with the War Department and charged with the capture and evaluation of German laboratories, scientific personnel, and documents relating to German scientific research important to the conduct of the war. The dominant factor in World War II, he said, was American industrial production.

"It is a fact that, with a few notable exceptions, German scientists really did a much less thorough job than we have done in the United States," he said. "In only one or two specialized fields, such as aerodynamics and jet propulsion, did their research effort approach ours. Almost all of their ideas on radar were taken from a study of such equipment on Allied planes which had been shot down and, at the end of the war, they remained far behind in its development."

On the other hand, Dr. Bates asserted, Nazi industry and engineering had done a good job of producing war machines.

Dr. Bates also told of his experiences as a member of a technical mission in South America during the last half of 1943 when he was on loan from Westinghouse to governments of the United States and Brazil. He told of his travel experiences there and of the agreement between the United States and the South American republics that in exchange for their help to us in World War II, we were to help industrialize South America. In his opinion this industrialization would not compete with our own to any appreciable extent.

In conclusion, Dr. Bates related his experience in a small German town where law and order were non-existent. He organized a police force of former French soldiers held in the town as prisoners and they gave him the title of General. We understand it is permissible to refer to him from now on as Dr. General Bates.

Centrifugal Castings Develop High Strength, Good Elongation

Reported by R. H. Harrington
Research Metallurgist, General Electric Co.

A new sound and color movie, "Golden Horizons", entertained the members of the Eastern New York Chapter on Oct. 9 by depicting the production of cast bronze from prehistoric times up to the present last-minute technique for casting and hot working aluminum bronze in the modern plant of Ampco Metal, Inc. in Milwaukee.

After the movie W. W. Edens, technical director of Ampco Metal, presented a talk on the present status of centrifugal casting. He described typical equipment, good and bad microstructures and how to avoid the latter, and the operating variables of speed of rotation (pressure), pouring temperature, mold temperature, and operating position of the axis of rotation of the casting.

He compared the advantages and disadvantages of centrifugal casting vs. gravity sand casting. Tensile data from test bars cut from actual castings showed that, in every case wherein the design of the casting permits centrifugal casting (approximate symmetry about an axis of rotation and removability from the metal mold), the centrifugal method develops appreciably higher strength properties together with as useful or better elongation. In general, such improvement in properties is due to diminished intergranular shrinkage, finer grain size, promotion of equi-axed grains, and separation of impurities to a casting surface from which they are machined in finishing the casting.

At the end of his talk, a period of rapid-fire questions indicated the interest of those present.

New Buildings Announced by Bridgeport

The Board of Directors of Bridgeport Brass Co. has approved a five to six million dollar program which is to include new buildings, new equipment and the modernization of many departments. The announcement of this reconversion program included a series of promotions and organization changes. Among the promotions were Mead W. Batchelor, vice-president in charge of production, named as a member of the Board of Directors, and John Dawson, Company counsel, to assistant secretary.

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Published by the
American Society for Metals
7301 Euclid Ave., Cleveland (3), Ohio

Subscriptions $5.00 per year ($6.00 foreign). Single copies $1.00. Entered as Second Class Matter, July 26, 1930, at the Post Office at Cleveland, Ohio, under the Act of March 3, 1879.

Ray T. Bayless ..... *Editor*
M. R. Hyslop ..... *Managing Editor*

Cleveland, Ohio—November, 1945
Volume XVIII Number 11

Southern Industry Exploited, Electronics "Debunked" In Dual Program at Georgia

Reported by R. L. Priess
Bell Aircraft Corp.

To stimulate interest in industrial progress and reconversion the Georgia Chapter of the American Society for Metals, in its initial fall meeting, spotlighted the Auto-Soler Co. of Atlanta with a talk by William H. Wilkerson, president of the company. In successive meetings other southern industries will be spotlighted and the program is hoped to be mutually beneficial to the executives and members.

Highlight of the evening was a talk on "Industrial Electronics" by L. W. Ballard, Jr., industrial control specialist in the Philadelphia office of the General Electric Co.

Mr. Wilkerson, who was one of the founders of the Georgia Chapter and its first chairman, surveyed the history of his 13-year-old company which manufactures automatic nailing machines for shoe repair shops and woodworking plants. He took a shoemaker's idea, turned his theory into practice, and after eight years of hard work accomplished what he started out to do. His formula was research, concentration on production problems to make a better product at a lower cost, aggressive selling and marketing, and a considerable volume of hard work. The success of his enterprise is apparent.

An enthusiastic open discussion followed Mr. Ballard's illustrated talk on "Industrial Electronics". Mr. Ballard debunked the "blue-sky" variety of electronics as "one of the greatest propaganda campaigns pushed on the American public in the last five to six years. Electronics is not only something for the future but is here today. It is a new tool that can be used with existing electrical and mechanical means to achieve higher production and better quality control."

The talk, supported by interesting lantern slides, covered the elementary principles of the electron microscope, profile calibration of gear teeth, timing of camera shutters, and radiographic industrial inspection applications, as applied to the measurement and inspection field. Induction and dielectric heating were discussed and applications in the power conversion equipment field.

The electronic control applications covered all industrial fields represented—furnace temperature control, photoelectric devices, gas torch cutting machines, electrostatic precipitation, common resistance welding and, most important, electronic motor control which establishes constant speed regardless of load changes.

Evans to Supervise Gas Turbine Materials as Chief Met for Elliott Co.

Charles T. Evans, Jr. has been appointed chief metallurgist for the Elliott Co., Jeannette, Pa.

Formerly manager of the carbide department of the Titusville plant of the Universal-Cyclops Steel Corp., he has been concerned with the development of heat resistant steels for application to high temperature steam and refinery valves, turbochargers, jet and rocket propulsion equipment. Another of his developments was a method for providing tungsten carbide bullet cores which, mounted in shells, were effective in stopping German tanks.

C. T. Evans, Jr.

One of the active organizers of the Northwest Pennsylvania Chapter of the ASM, Mr. Evans has, since 1941, served as a member of the National Advisory Committee for Aeronautics.

In his new assignment he will be responsible for the metallurgical problems of the whole Elliott Company, with particular attention to the metallurgical aspects of research and production of gas turbines.

German Research Should Not Be Abolished Bates Believes After War Dept. Mission

Reported by Robert B. Wallace
Metallurgist, Carnegie-Illinois Steel Corp.

With sidelights such as "washing his socks in champagne", "wading knee deep in red wine" and the "hot bath dates of Paris", A. Allan Bates described Germany as he found it on a recent War Department mission in which he was charged with the capture and evaluation of German scientific laboratories and personnel. The talk was given before the opening meeting of the Mahoning Valley Chapter ASM.

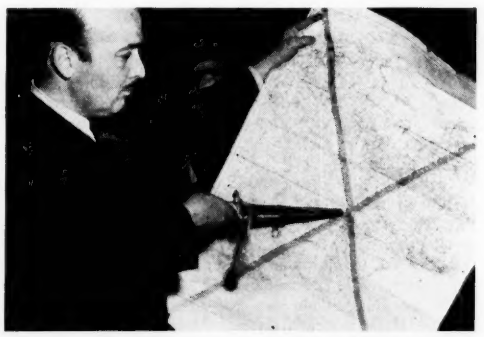
Dr. Bates praised the strategic bombing by which the allies devastated the inhabitable part of towns along with the transportation system while frequently leaving steel mills practically intact. In one case he found a mill ready to run at the touch of a button and with a stock of thousands of tons of alloy and stainless steels, but without any workers or means of transportation within a radius of 10 to 12 miles.

Perhaps the most startling revelation made by Dr. Bates was the fact that the Germans did not centralize or consolidate all their efforts in scientific research until early 1944. He documented this fact by letters taken by him from Nazi personal files, in which a certain German scientist was asked to head the iron and steel division in an organization that would compare to our Office of Scientific Research and Development.

Dr. Bates' group included 200 specialists from the intelligence division. In a secret hideout in the Hartz Mountains they captured the head of the whole newly organized German research organization plus 125 of his co-workers. On the whole, the captured German scientists were quite willing to talk and for the most part they wanted to come to the United States and work for U. S. companies.

A plea for the allies not to stop or destroy German research was made by Dr. Bates as he disclosed that by far the greater part of all research in Germany was the same in war as it had been in peacetime. "The German original research helped us to win this war as much as our own did. Examples of this are the hard carbide tipped tools and many of the alloys used in our airplanes and tanks," stated Dr. Bates. He further pointed out that German research is basically sound and can be of benefit to mankind.

However, he did advocate the elimination of militarism in all its forms in Germany with special emphasis on the S.S. and Gestapo.



Dr. Bates uses German admiral's ceremonial dagger to point out German invasion map of the English coast which was captured by the Allies, who in turn printed the invasion map of Germany on reverse side. (Photograph by Robert B. Wallace)

Large Initial Grain Size Gives Best Structure in Wire

Reported by A. E. Thurber
Technical Supervisor, Oneida, Ltd.

A brief review of the development of wire drawing from its early days preceded a discussion of the theory and practice of producing high grade steel wire at the October meeting of the Syracuse Chapter. "The Influence of Grain Size on the Manufacture of Steel Wire" was the title of the talk presented by Benjamin L. McCarthy, chief metallurgist of the Wickwire Spencer Steel Co.

Micrograph slides illustrating the manner in which slip planes occur, showed conclusively why well-distributed pearlite is most suitable for production of high tensile wire. The procedure for obtaining such a structure in both low and high carbon steels (except for oil tempered wire) calls for an initial large grain size which, during drawing and process heat treatments, maintains the desirable structure.

For low carbon steels batch annealing is required, and for high carbon a patenting treatment is best suited. The annealing temperature is kept below the critical point A_1, and in the patenting process the steel is quenched in lead or air following the anneal.

Of especial interest was a series of sensitive tinted slides obtained by means of polarized light. Various constituents are distinctly identified by color at low magnifications.

Van Horn Discusses Uses of X-Rays For Inspecting Welds and Castings

Reported by R. R. Robinson
Section Engineer, Colorado Fuel and Iron Corp.

Uses of X-rays in industry, particularly in the inspection of welds, castings and metal assemblies, were discussed on Sept. 20 at the first fall meeting of the Pueblo Group, Rocky Mountain Chapter ASM, by Kent R. Van Horn of Cleveland, national president of the Society, and assistant manager of the Cleveland Research Division, Aluminum Co. of America.

W. H. Eisenman, ASM national secretary, reported to the members on work being done by the Society, and various new services which it is planning to offer, particularly to war veterans returning to the metals industry. These services, he emphasized, are not restricted to ASM members.

Tool Steel Selection Factor in Product Cost

Reported by A. P. Barone
Metallurgist, Minneapolis-Moline Power Implement Co.

A. J. Scheid, chief metallurgist, Columbia Tool Steel Co., talked about "Postwar Tool Steels" before the North West Chapter on Oct. 11. He pointed out that the selection and use of tool steels will be one of the important factors in determining the cost of manufacture of consumers' goods. Mr. Scheid's talk is reported in detail on page 3.

Sub-Zero Treatment Improves Steel Quality by Completing Austenite Transformation

Reported by O. Cutler Shepard
Associate Professor of Mining and Metallurgy, Stanford Univ.

The Golden Gate Chapter met in San Francisco on Sept. 17 to hear Ben Berlien of the Industrial Steel Treating Co. talk on the "Relationship of Sub-Zero Temperatures to Conventional Heat Treatment of Steel."

Mr. Berlien took issue with those who think that correct heat treatment eliminates the need for sub-zero treatment. He believes that the metallurgist contends with factors beyond his control which sometimes interfere with ideal heat treatment. When this occurs sub-zero treatment may greatly improve the quality of the steel.

The transformation of austenite to martensite during quenching takes place near room temperature. Berlien stated that the temperature of transformation is lowered by an increase of dissolved carbon to the extent that high carbon steels are incompletely transformed on quenching to room temperature. A carbon steel containing 1% carbon will usually retain about 5% austenite. This is mostly transformed by one sub-zero treatment. Complete transformation increases the hardness, the dimensional stability, and the homogeneity of the material.

Some alloying elements in steel, such as chromium, greatly increase the amount of retained austenite by making the austenite transformation sluggish.

Among problems solved by sub-zero treatment Mr. Berlien mentioned an SAE 52100 pump plunger which developed cracks on grinding. The cracks were due to transformation of retained austenite to brittle, untempered martensite.

Mr. Berlien stated that quenched steels which are Rockwell soft and file hard contain considerable retained austenite. Such steels are soft because of the austenite but filing causes the austenite to transform to martensite and hence they are file hard. Such steels are benefited by a sub-zero treatment.

Metal Requirements Outlined For Oil Production, Refining

Reported by M. W. Williams
Hughes Tool Co.

A symposium on the use of metals in the oil industry opened the fall season of the Texas Chapter ASM on Sept. 13. Guest speakers were H. D. Wilde, manager of research and development for Humble Oil & Refining Co., and Paul Weaver, chief geophysicist of the Gulf Oil Co.

Each barrel of oil produced in the U. S. requires about 3 lb. of steel in the form of casing, tubing, pumps, and other equipment, Mr. Weaver told the audience. The use of metals—principally steel—by the petroleum industry has increased greatly with the increased depth of the wells now being drilled. The exploration and production of petroleum will require millions of tons of steel per year for replacement and maintenance of existing producing wells, drilling wells in developed fields, and drilling of new exploratory wells.

Mr. Weaver presented a real challenge to the metal industry and equipment manufacturers to supply the petroleum producing industry with improved metals and methods in order to decrease the present high cost of producing oil. He emphasized the need for metals to withstand corrosion, erosion and high temperatures.

Dr. Wilde spoke on "Metals in Oil Refining" and discussed the three methods of refining petroleum—namely, distillation, thermal conversion and catalytic conversion. He stressed the use of alloy steels to withstand high temperatures, corrosive and erosive fluids and gases. New methods of refining place new demands upon the metallurgists to produce metals which will withstand higher temperatures, greater pressures and frequently unusual corrosion conditions.

U. S. Technology Evaluated Against World Background

Reported by John DeMoss
University of Notre Dame

"Impressions of World-Wide Metallurgy" was the intriguing title of an exceptionally interesting talk by Robert F. Mehl, head of the department of metallurgical engineering and director of the Metals Research Laboratory, Carnegie Institute of Technology. Dr. Mehl initiated the 1945-46 technical program of the Notre Dame Chapter on Oct. 10.

As a result of his recent trips to South America and through war-torn Europe in an official capacity, beginning before V-E day, Dr. Mehl was able to discuss with authority the past and future of the metallurgical profession in America against a world background.

The speaker emphasized that the United States must maintain its present world leadership in science and engineering against foreign competition (particularly that of Russia) if we are to maintain our present security and our social and economic well-being.

Brazil, the country first visited by Dr. Mehl, is expanding rapidly in science and technology but it still is largely undeveloped. This very large South American country has tremendous deposits of very high grade iron ore but little coal, and that of poor quality, so that smelting must be performed with charcoal. There is an increasing tendency for Brazil and many other countries, the speaker pointed out, to look to the United States rather than to Europe for technical assistance and education. This situation should strongly cement inter-American relations.

In England, the speaker was struck by the difficulties which English industry and technology had during the period between the two world wars. The fighting spirit of the English is admirable but England seems to be at the present much in need of improvement in technology as well as in education.

France is dormant technically and industrially and, except for a few instances, has been so for a number of years even prior to the war.

Dr. Mehl, along with Sam Hoyt, enjoyed (?) an interesting jeep ride through Germany to the Kaiser Wilhelm Institüt für Eisenforschung which had been moved from Düsseldorf, now a heap of rubble, to Clausthal in the Hartz Mountains. Many leading German metallurgists and other scientists were interviewed there.

Neither the speaker nor any of his party was allowed to enter any part of Russian-occupied territory, although that had been originally planned.

Dr. Mehl concluded by speaking of the much-discussed report by Vannevar Bush, head of the Office of Scientific Research and Development. This was particularly apropos in view of the recent rapid advance of Russian science which is, of course, government-supported.

Dr. Mehl showed numerous fine slides illustrating his travels.

Rules for Annealing Cycle Based on TTT-Curves Given

Reported by Robert F. Last
Deere & Co.

The modern concept of annealing steel as embodied in the Transformation-Temperature-Time (TTT) curves was thoroughly explained by Peter Payson of Crucible Steel Co. of America before the Tri-City Chapter ASM.

Mr. Payson showed that a definite relationship exists between transformation at a constant subcritical temperature and transformation during continuous cooling. Based on data shown, it is safe to assume that transformation during continuous cooling is completed at a temperature no lower than 50° F. below the intersection of the superposed cooling curve and the end of transformation line of the TTT-curve. This relationship enables one to establish the rate of cooling necessary, in a continuous cooling anneal, to give the desired structure and hardness, if a TTT-curve has been established for the steel in question.

Emphasis was laid on the fact that no one cycle will fit all steels. To illustrate, Mr. Payson presented slides of five steels that had been transformed at constant subcritical temperature of 1200° F. They demonstrated that for 4342 and 4640 steel this temperature was satisfactory. For a 52100 steel and a Rex M-2 tool steel this temperature was too low. For a 2340 steel, 1200° F. was found to be too high.

In concluding his lecture, Mr. Payson set forth a few simple rules to be borne in mind in setting up an annealing cycle:

The higher the austenitizing temperature, the greater the tendency for the annealed structure to be lamellar. Inversely, the closer the austenitizing temperature is to the critical temperature, the greater the tendency for the annealed structure to be spheroidal.

To develop the softest condition in steel, austenitize at a temperature usually less than 100° F. above the critical temperature and transform at a temperature usually less than 100° F. below the critical.

After the steel is austenitized, cool as rapidly as feasible to the transformation temperature. Further, when the transformation is complete cool as rapidly as is feasible to room temperature in order to decrease the total time of the annealing cycle.

For housing reservations for 27th National Metal Congress and Exposition, see coupon on page 7.

Engineering Depts. Cooperate In War Effort, Reconversion

Reported by T. H. Spencer
Caterpillar Tractor Co.

"Production Planning" was the topic presented by E. W. Bernitt, plant engineer, Nash Motors Division, Nash Kelvinator Corp., before the Peoria Chapter's October meeting.

Mr. Bernitt described the part Nash Motors played in the production of aircraft engines and propellers for the war effort, telling how the Nash plants converted to war

Norman Dirks (left), chief metallurgist of R. G. LeTourneau, Inc., questions E. W. Bernitt, plant engineer, Nash Motors Division, Nash Kelvinator Corp., about further details of his talk on "Production Planning" before the Peoria Chapter. At right is Gordon Swardenski, general superintendent, planning dept., Caterpillar Tractor Co., technical chairman of the meeting.

production and are now reconverting to automotive production. The three engineering divisions of Nash Motors which cooperated in these programs are the product design, master mechanics and plant engineering divisions. The speaker presented many slides depicting progress on war production and subsequent reconversion with its manifold improvements gained from war experience.

An extra October meeting was held on the 22nd, when R. B. Seger of Lindberg Engineering Co. presented an address on "Martempering".

The talk was followed by "Heat Treating Hints", a 45-min. movie in sound and color made in the Lindberg plant. The actors were the editors of the magazine *Heat Treating Hints;* they operated the furnaces and quench tanks, applying modern metallurgical knowledge and practical mechanical ingenuity to the problems every heat treater encounters.

Puget Sound Sponsors Intensive Lecture Course on Cast Metals

A series of lectures on "Design and Engineering Properties of Cast Metals" was presented in early November by the Puget Sound Chapter of the ASM as its annual educational course. C. R. Jackson of E. F. Houghton Co., Seattle, was chairman of the course, which was organized with the assistance of A. G. Zima of International Nickel Co. Lecturers and subjects were as follows:

Nov. 5—Design of Castings, by John E. Wilson, Climax Molybdenum Co.; Selection of Cast Alloy, by Harry P. Evans, Boeing Aircraft Co.

Nov. 6—Cast Steel and Its Heat Treatment, by John E. Wilson, Climax Molybdenum Co.

Nov. 7—Cast Iron and Its Heat Treatment, by Albert G. Zima, International Nickel Co.

Nov. 8—Cast Aluminum Alloys and Magnesium Alloys and Their Heat Treatment, by Roy E. Paine, Aluminum Co. of America.

Nov. 9—Inspection of Castings, by Henry A. Solow, X-Ray Products Corp.

Chapin Speaks on Heat Treatment

Reported by A. J. Newsom
Schwitzer-Cummins Co.

W. R. Chapin of the E. C. Atkins Co. was the speaker at the October meeting of the Indianapolis Chapter. The subject was "Some Observations in the Heat Treatment of Steel".

The physical characteristics and the results of transformation caused by heat treatment were explained. Martensitic structure, its formation and characteristics, was discussed in such a way that a heat treater could understand why certain tools cracked and how to prevent the cracking of similar tools.

Northwest Light Metals Clinic Held

Under the direction of Eri B. Parker, acting head of Washington State College's new division of industrial research, a two-day light metals clinic was held at Pullman Oct. 22 and 23. Designed to stimulate and encourage the use of light metals in northwest manufacturing to produce more jobs in this area, the clinic included panel discussions, tours and displays on various phases of the light metals industry.

A.S.M. Program for National Metal Congress

Technical Sessions

Monday, Feb. 4 — 9:30 A. M.

Session No. 1

Drawability of Aluminum Alloys at Elevated Temperatures. Part I—Deep Drawing Cylindrical Cups, by D. M. Finch, S. P. Wilson and J. E. Dorn, University of California.

Deep Drawing Aluminum Alloys at Elevated Temperatures. Part II—Deep Drawing Boxes, by D. M. Finch, S. P. Wilson and J. E. Dorn, University of California.

New Aluminum Alloys Containing Small Amounts of Beryllium, by R. H. Harrington, General Electric Co.

Session No. 2

The Partition of Molybdenum in Hypo-Eutectoid Iron-Carbon-Molybdenum Alloys, by Fred E. Bowman, Climax Molybdenum Co.

The Effect of Variations in Composition and Heat Treatment on Some Properties of 4 to 6% Chromium Steel Containing Molybdenum and Titanium, by Geo. F. Comstock, Titanium Alloy Mfg. Co.

Iron-Manganese Alloys—the Properties of Cold-Worked and Heat Treated Alloys Containing 1 to 7% Manganese, by R. S. Dean, J. R. Long, T. R. Graham and R. G. Feustel, Bureau of Mines.

Session No. 3

The Application of Ms Points to Case Depth Measurement, by E. S. Rowland and S. R. Lyle, Timken Roller Bearing Co.

A Mechanism of the Surface Decarburization of Steel, by W. A. Pennington, Carrier Corp.

Graphite in Cold Rolled Subcritically Annealed Hypo-Eutectoid Steels, by M. A. Hughes and J. G. Cutton, Carnegie-Illinois Steel Corp.

Tuesday, Feb. 5 — 9:30 A. M.

Session No. 1

High Forging Temperatures Revealed by Facets in Fracture Tests, by J. Robert Strohm and W. E. Jominy, Chrysler Corp.

Critical Points of SAE 4340 Steel as Determined by the Dilatometric Method, by D. Niconoff, Republic Steel Corp.

Gas Evolution from Cast Steel at Room Temperature, by H. H. Johnson, L. H. Arner and H. A. Schwartz, National Malleable & Steel Castings Co.

Session No. 2

The Effects of Combined Stresses and Low Temperatures on the Mechanical Properties of Some Non-Ferrous Metals, by D. J. McAdam, Jr., G. W. Geil and R. W. Mebs, National Bureau of Standards.

Temper Brittleness, by John H. Hollomon, Watertown Arsenal.

Fracture of Metals Under Combined Stresses, by D. J. McAdam, Jr., National Bureau of Standards.

Session No. 3

Soft Soldering, by M. E. Fine and R. L. Dowdell, University of Minnesota.

The Cold Working and Heat Treatment of a 10-Karat Gold Alloy, by Vernon H. Patterson and B. N. Iannone, Bausch & Lomb Optical Co.

Tellurium in the Iron Foundry, by James O. Vadeboncoeur, General Motors Corp.

Tuesday, Feb. 5 — 2:00 P. M.

Session No. 1

Investigation of a Type of Failure of 18-8 Stabilized Stainless Steel, by W. C. Kahn, H. Oster and R. Wachtell, Republic Aviation Corp.

The Influence of Carbon Content Upon the Transformations in 3% Chromium Steel, by Taylor Lyman, Bendix Aviation Corp., and A. R. Troiano, University of Notre Dame.

Effect of Nickel on Physical Properties and Thermal Characteristics of Some Cast Chromium-Molybdenum Steels, by N. A. Ziegler and W. L. Meinhart, Crane Co.

Session No. 2

Factors Affecting the Hardenability of Boron-Treated Steels, by R. A. Grange and T. M. Garvey, U. S. Steel Corp. Research Laboratories.

Quenching of Steel Balls and Rings, by Victor Paschkis, Columbia University.

Mass Temperature Effects on Quenching 36% Cobalt Magnet Steel, by Benjamin Falk, Simonds Saw & Steel Co.

Wednesday, Feb. 6 — 10:00 A. M.

Edward de Mille Campbell Memorial Lecture, by M. Gensamer, Pennsylvania State College.

Wednesday, Feb. 6 — 2:00 P. M.

Session No. 1

Anti-Reflection Films for Metallographic Objectives, by James R. Benford, Bausch & Lomb Optical Co.

Detection, Causes and Prevention of Injury in Ground Surfaces, by L. P. Tarasov, Norton Co.

The Practical Application of Statistical Methods in a Quality Control Program, by W. T. Rogers, National Tube Co.

Session No. 2

Stress Comparisons by Correlation With High Frequency Magnetic and Eddy Current Losses, by P. E. Cavanagh, Allen B. DuMont Labs.

Metallurgical Characteristics of Induction-Hardened Steel, by James W. Poynter, Army Air Forces, Wright Field.

Induction Hardening and Austenitizing Characteristics of Several Medium Carbon Steels, by D. L. Martin, General Electric Co., and W. G. Van Note, North Carolina State College.

THE ENTIRE technical program prepared for the 1945 National Metal Congress will be presented in Cleveland during the Metal Congress, Feb. 4 to 8, 1946. A splendid array of papers has been secured, and a large number of outstanding authors will present the results of important researches and investigations.

The arrangement of the technical sessions is presented at this early date so that members may make their plans to visit Cleveland and attend those sessions which are of greatest importance to them. It will be observed that the technical program has been arranged in 11 sessions on Monday, Tuesday and Wednesday.

Beginning Thursday and continuing Friday, four educational lecture series will be presented on the subjects of: (1) Magnesium, (2) Induction Heating, (3) Surface Stressing of Metals, (4) Corrosion of Metals. Each subject will have five different lecturers who have coordinated their contributions into a compact unit of important metallurgical information.

Annealing Expert at Boston

Peter Payson, Crucible Steel Co. of America, discusses his talk on "A Modern Viewpoint of the Annealing of Steel" with Boston's past chairman A. D. Bach (left) and Chairman Ray Sault (right). Mr. Payson addressed the Boston Chapter ASM on Oct. 5. His talk has been reported in previous issues of THE METALS REVIEW. Prof. Frederick K. Morris of Cambridge, Mass. was the coffee speaker, discussing apparent contradictions within the Charter of the United Nations. (Photograph by H. E. Handy.)

Reasons for Variety of Tool & Die Steels Explained

Reported by Daniel J. Clini
Heatbath Corp.

An address on the broad and interesting subject of "Selection and Heat Treatment of Tool and Die Steels" was presented before members of the Springfield (Mass.) Chapter on October 15 in Springfield, Vt.—the first meeting ever held out of the state.

Speaker of the evening was Leonard C. Grimshaw. Ray P. Kells conducted the question and answer session after the address. Mr. Grimshaw is chief metallurgist and Mr. Kells is chief service engineer of the Latrobe Electric Steel Co.

Mr. Grimshaw explained why so many different kinds of tool steels are made, and also took examples of certain cutting tools and dies that are known by experience to give their best performance when made out of each particular steel under discussion. Each tool and die was illustrated, its analysis was discussed, and the heat treatment that would be used for hardening it was described.

Cutting tools ranging from plain carbon steel to the cobalt high speed steels were described, together with typical applications. Die steels were discussed, ranging from plain carbon steel to the finest die steels for cold work, including also the hot work die steels, and the die casting steels.

Each application and tool or die was illustrated with lantern slides, and various precautions to be taken during heat treatment were outlined.

Henry Flynn of The Fellows Gear Shaper Co. was coffee speaker for the evening, presenting a witty discourse about Vermont's history, politics and products.

Coffinberry Made Professor at Kentucky

Arthur S. Coffinberry has resigned from Tube Turns, Inc. to become associate professor in the department of mining and metallurgical engineering at the University of Kentucky. He will remain affiliated with the Louisville Chapter ASM, but is resigning his post as secretary-treasurer. J. S. Goodman of Standard Sanitary Corp. has been appointed to take over the duties as Chapter secretary-treasurer.

Four Lecture Courses on

Magnesium

Induction Heating (Without Melting)

Effect of Surface Stressing of Metals on Endurance in Repeated Loadings

Corrosion of Metals

Thursday, Feb. 7 — 9:00 A. M.

Lecture 1 on Magnesium: **Origin of Metal and Basic Properties,** by Prof. L. M. Pidgeon, University of Toronto.

Lecture 1 on Induction Heating: **Principles and Theory of Induction Heating (Including Dielectric Induction Heating),** by H. B. Osborn, Jr., Ohio Crankshaft Co.

Lecture 1 on Surface Stressing: **The Problem Defined,** by H. F. Moore, University of Illinois.

Lecture 1 on Corrosion: **Basic Principles of Metallic Corrosion,** by Carl W. Borgmann, University of Colorado.

Thursday, Feb. 7 — 10:30 A. M.

Lecture 2 on Magnesium: **Magnesium Structural Design,** by J. C. Mathes, Dow Chemical Co.

Lecture 2 on Induction Heating: **Induction Heating Circuits and Frequency Generation,** by P. H. Brace, Westinghouse Electric Corp.

Lecture 2 on Surface Stressing: **Measurement of Stresses at Surface,** by W. M. Murray, Society for Experimental Stress Analysis.

Lecture 2 on Corrosion: **Effect of Composition and Environment on Corrosion of Iron and Steel,** by C. P. Larrabee, Carnegie-Illinois Steel Corp.

Thursday, Feb. 7 — 4:30 P. M.

Lecture 3 on Magnesium: **Castings,** by N. E. Woldman, Bendix Aviation Corp.

Lecture 3 on Induction Heating: **Practical Application of the Motor-Generator Type of Induction Heating (Frequencies up to 10,000 Cycles),** by W. G. Johnson, Caterpillar Tractor Co.

Lecture 3 on Surface Stressing: **Methods of Applying and Tests Used Including Carburizing and Nitriding,** by J. O. Almen, General Motors Corp.

Lecture 3 on Corrosion: **Corrosion Resistance of Stainless Steels and High Nickel Alloys,** by W. O. Binder, Union Carbide & Carbon Research Laboratories.

Friday, Feb. 8 — 9:00 A. M.

Lecture 4 on Magnesium: **A Survey of Wrought Magnesium Alloy Fabrication,** by J. V. Winkler, Dow Chemical Co.

Lecture 4 on Induction Heating: **Practical Applications of High Frequency Induction Heating (100,000 Cycles and Up),** by J. W. Cable, Induction Heating Corp.

Lecture 4 on Surface Stressing: **Stressing Axles and Other Railroad Equipment by Cold Rolling,** by O. J. Horger, Timken Roller Bearing Co.

Lecture 4 on Corrosion: **Corrosion of Light Metals (Aluminum and Magnesium),** by E. H. Dix, Jr., Aluminum Co. of America.

Friday, Feb. 8 — 10:30 A. M.

Lecture 5 on Magnesium: **Corrosion,** by W. S. Loose, Dow Chemical Co.

Lecture 5 on Induction Heating: **Comparison of Induction Heating to Other Methods of Heat Treating,** by T. E. Eagan, Cooper-Bessemer Corp.

Lecture 5 on Surface Stressing: **Progressive Stress Damage,** by Peter R. Kosting, Watertown Arsenal.

Lecture 5 on Corrosion: **Corrosion of Copper and Brass,** by H. L. Burghoff, Chase Brass & Copper Co.

Roll Design and Rolling Practices Opening Subject in Educational Series

Reported by H. L. Millar
Metallurgist, Plomb Tool Co.

At the opening meeting of the fall educational lecture series, conducted by the Los Angeles Chapter ASM under the direction of E. B. Brooker, an informal discussion of the subject of "Roll Design and Rolling Practices as They Affect the Quality of Steel" was led by Marshal Orris, rolling superintendent, Columbia Steel Co., Torrance, Calif.

Mr. Orris reviewed briefly the history of rolling and stated that the development of the art until the early part of the 20th Century had been limited by the fact that the only available knowledge on the subject was in the hands of a few who jealously guarded their information. However, as the industry expanded, satisfactory rolling practices have been established. Although conditions of rolling vary with different mills and different steels, end products in the same grades are comparable.

The audience, led by J. A. Burgard, Columbia Steel Co., entered into an enthusiastic round-table discussion of the subject.

Hall Resumes Consulting Practice

John Howe Hall has resigned his position as assistant metallurgist at General Steel Castings Corp., and is resuming consulting practice in steel foundry work at Swarthmore, Pa. He will be retained by General Steel Castings Corp. in a consulting capacity.

Metallurgist Must Shoulder Responsibility For Metal Failures, Riegel Admonishes

Speakers' Table at the joint meeting of the Tri-City and Cedar Rapids Chapters ASM. Left to right are R. L. May, vice-chairman, Cedar Rapids Chapter; Prof. H. O. Croft of State University of Iowa, technical chairman; Glen C. Riegel, the speaker; John Fielding of State University of Iowa, general chairman of the meeting; and Russell Swartz, chairman of the Tri-City Chapter.

Reported by A. H. Rauch
Metallurgist, Deere & Co.

Glen C. Riegel, chief metallurgist, Caterpillar Tractor Co., was induced to break his war-long self-imposed silence to address the first joint meeting of the Cedar Rapids and Tri-City Chapters on Oct. 1. Speaking on "The Metallurgist's Responsibility for the Failure of Metals", Mr. Riegel maintained that the metallurgist must often shoulder responsibility for failures in order to improve the properties of metals. He demonstrated the validity of his thesis with many convincing examples.

Two types of failures were discussed—sudden failures and progressive or fatigue failures. Either type may occur without advance notice. The sudden type of failure occurs with little or no yielding due to suddenly applied tri-axial stresses; fatigue failures progress from some stress raiser such as a notch, quench crack, corrosion pit, etc., until the section remaining cannot carry the load applied and sudden failure occurs.

An interesting example was cited of the failure on slight impact of a main frame for a motor grader in cold weather. The part was made of 9-in. ship channel of a low carbon rimmed steel. Tensile and Charpy impact tests at room temperature indicated satisfactory properties. However, the steel was found to show brittle behavior on Charpy impact testing at sub-zero temperatures. The part was improved by *(a)* changing from a rimmed to a killed steel which is less sensitive to temperature change and *(b)* changing the point of attachment of the frame.

In the induction hardening of crankshaft bearings, it was found that the hardening of the oil hole caused the endurance limit to decrease 50%. This condition can be remedied by cold working the oil hole—such as by rolling or shot peening. Mr. Riegel maintained that there is usually an appropriate remedy for every failure. The metallurgist must use every tool at his command to make certain that the metal is satisfactory.

In the production of cast ferrous metals the metallurgist must maintain control over foundry practice and employ rigid inspection to make certain the metal meets requirements. Examples were cited of the effect of molding practice in gray iron, of the effect of chromium on the annealability of malleable iron, and of the effect of soundness and composition on the weldability of steel castings.

In wrought steels, it was pointed out that there is much yet to be learned on the effect of melting and deoxidation process on the behavior and properties in service. Steels of identical chemical composition may behave quite differently in service.

Help for French Engineers!

THE FOOD shortage in French cities is desperate. Send a 5-lb. box monthly to an acquaintance. (If you have none, the ASM will send you a name and address.) Use the "overseas shipper" standardized for U. S. armed forces, and customs tags supplied by your post office. Send concentrated foods high in fat and protein in *tight* tin or paper containers. Crisco, powdered milk or eggs, beans, chocolate, bouillon cubes, vitamin pills, sugar, coffee—these will make literally the difference between life and death.

Authority on Powder Metals Becomes Professor at New Mexico

The New Mexico School of Mines has announced the appointment of A. S. Henderson as professor of metallurgy and chairman of the department. Henderson, an authority in the field of high purity metal powders, is also a consultant for the New Mexico State Bureau of Mines and Mineral Resources.

He has been employed by General Motors as a physical metallurgist and has served on the staff of the Battelle Memorial Institute, Columbus, Ohio. He holds a number of patents pertaining to metallurgical and chemical processes. He is a graduate of the Adams State Teachers College, Alamosa, Colo., and of the engineering school of the University of Cincinnati.

Compliments

TO EINAR T. YOUNG of the Naval Ordnance Laboratory in Washington, D. C., on the presentation of the Meritorious Civilian Service Award for outstanding contributions in the design and development of mine cases.

TO C. F. AGERSTRAND, president and founder of the Agerstrand Corp., on his commendation by Rear Admiral Reginald R. Belknap, chairman of the Laymen's National Committee, for his support of National Bible Week.

TO FRANCIS C. FRARY, director of research of Aluminum Co. of America, on the award of the Perkin Medal of the American Section of the Society of Chemical Industry in recognition of his outstanding accomplishments in the field of industrial research.

TO WALDEMAR NAUJOKS, chief engineer of the Steel Improvement and Forge Co., Cleveland, on his appointment as a member of the Technical Committee of the Drop Forging Association.

TO ALFRED A. NORTHACKER, director of follow-up, the M. W. Kellogg Co., New York, on his election as a director of the Metropolitan Purchasers' Assistants Club.

TO CHARLES C. EELES, industrial engineer, The Ohio Fuel Gas Co., Toledo, Ohio, on his appointment as chairman of the Committee on Heat Treating and Finishing of the American Gas Association.

A.S.M. REVIEW OF CURRENT METAL LITERATURE

An Annotated Survey of Engineering, Scientific and Industrial Journals and Books Here and Abroad, Received in the Library of Battelle Memorial Institute, Columbus, Ohio, During the Past Month. Prepared by Thelma Reinberg, Librarian

1. ORES & RAW MATERIALS

Production; Mining; Beneficiation

1-42. **The Technical Basis of Atomic Explosives.** *Electronics*, v. 18, Oct. '45, pp. 109-113.
Production and use of the two principal atomic explosives, uranium-235 and the new element plutonium.

1-43. **Uranium and Its Isotopes.** *Metal Industry*, v. 67, Sept. 28, '45, p. 201.
General principles of the atomic bomb — separation methods.

1-44. **Vanadium—A Metal Named for a Goddess.** C. H. Vivian. *Compressed Air Magazine*, v. 50, Oct. '45, pp. 260-264.
History of vanadium.

1-45. **Magnetic Separation.** R. H. Stearns. *Steel*, v. 117, Oct. 22, '45, pp. 120, 122.
Method of segregating materials finding many new uses in industry. Magnetic separation considered necessary under four classifications: Purification, protection, recovery and segregation.

1-46. **Open-Hearth Charge Ores.** Clyde Denlinger. American Iron and Steel Institute Yearbook, Advance Copy, 1945, 9 pp. Also *Blast Furnace & Steel Plant*, v. 33, Oct. '45, pp. 1258-1261, 1277.
Wartime need for using more pig iron in making open-hearth steel to offset the reduced supply of scrap imposed new problems of raw materials selection. Selection of iron ores to counteract the additional amount of carbon present in pig iron has presented problems as to grade of the ore, analysis, and preliminary treatment. Steelmakers adept in varying procedures to utilize available raw materials.

1-47. **Agglomeration of Fine Taconite Concentrates.** M. F. Morgan. *Steel*, v. 117, Oct. 1, '45, pp. 132, 135-136, 138, 166, 168, 170.
History of Davis agglomerating process, nodulizing, briquetting and sintering of iron-bearing materials and the merits of each method are presented. Industry is confronted with problems after taconites are successfully concentrated. Estimated costs of taconite sinters are compared.

2. SMELTING AND REFINING

2-105. **Zinc Smelting and Refining.** W. H. Dennis. *Mine & Quarry Engineering*, v. 10, Sept. '45, pp. 211-220.
Review of present-day practice with special note on the use of refractories.

2-106. **Beryllium and Its Alloys.** W. J. Kroll. *Metal Industry*, v. 67, Sept. 14, '45, pp. 167-168.
Examines and critically analyzes the processes available for the manufacture of beryllium alloys, including their preparation direct from the ore.

2-107. **Determining Lime-Silica Ratios for Open-Hearth Control by Mathematical Computation Using FeO and Fe_2O_3 Values.** John S. Coulter. *Blast Furnace & Steel Plant*, v. 33, Oct. '45, pp. 1242-1247.
Outlines the development and describes the method for slag control work, where rapidity in determining an accurate lime-silica ratio is necessary.

2-108. **Considerations on Blast Furnace Practice, Part II.** T. P. Colclough. *Blast Furnace & Steel Plant*, v. 33, Oct. '45, pp. 1253-1257.
Sintering; effect of slag volume on coke consumption; acid burdening; ore beneficiation; relation between size of ore and carbon for reduction.

2-109. **Wartime Changes That Will Affect Peacetime Steelmaking.** Frank G. Norris. *Metal Progress*, v. 48, Oct. '45, pp. 631-637.
Improvements in low grade ore beneficiation will keep pace with the depletion of our high grade deposits. Design of open-hearth furnace is becoming stabilized; trend noted toward use of oil for fuel and refractories containing synthetic magnesia. Aluminum ladle additions have replaced wartime use of borax, because of cheapness and additional desirable effects. Improvements in the refining stage await better pyrometry.

2-110. **Acid Electric Process for Steel Castings.** John Juppenlatz. *Metal Progress*, v. 48, Oct. '45, pp. 638-641.
Steel foundry practice (3 to 5-ton furnaces). Important trend is toward ample transformer capacity, up to 100 kva. per sq.ft. of hearth. Roof life improved by better grade of silica brick, more carefully laid and preheated, and kept hot when furnace is idling by auxiliary gas flame. All but universal features: Removable roofs for bucket charging; slag control by color *plus* Herty's viscosimeter; closer approach to equilibrium between slag and metal at end of refining period; better and more uniform steel.

2-111. **The Basic Electric Furnace for Steelmaking.** S. D. Gladding and H. C. Bigge. *Metal Progress*, v. 48, Oct. '45, pp. 642-651.
Physico-chemical principles of refining in 50 to 100-ton furnaces. Mechanical, operational and metallurgical considerations necessary for success of various duplex and triplex processes. Recommends 62% Al_2O_3 sillimanite brick made from calcined Indian kyanite as best improvement over silica roof brick. Detailed technique of ramming bottoms. Use of inert gas in furnace and ladle when making special high alloys. Accurate spectrographic analyses of alloys in 9 to 15 min.

3. PROPERTIES OF METALS AND ALLOYS

3-181. **Machinability of Aluminum Alloys.** *Light Metal Age*, v. 3, Sept. '45, pp. 8-9, 32, 42, 44.
Discusses the machinability of aluminum alloys from the standpoint of their metallurgy. Describes the effect of alloying constituents and heat treatment upon the machinability of aluminum alloys. Recommendations are made as to machining practice. 28 ref.

3-182. **Cerium—Light Metal Alloys.** *Light Metal Age*, v. 3, Sept. '45, pp. 21-22, 32.
Application of cerium mischmetal with aluminum and magnesium alloys; information heretofore has been somewhat sketchy and uncorrelated. Up-to-date summary. Information annotated giving references and sources of information. 37 ref.

3-183. **Measuring Wire Stiffness by Low Stress Elongation.** C. B. Shopmyer. *Wire & Wire Products*, v. 20, Oct. '45, pp. 752-753, 756.
One of the most important properties of magnet wire is its softness or windability. Discusses in a very general way some of the methods of measuring this property.

3-184. **Condensed Review of Some Recently Developed Materials.** *Machinery*, v. 52, Oct. '45, pp. 173-183.
Arranged alphabetically by trade names.

3-185. **18:8 Stainless Steel.** Herbert H. Uhlig. *Iron & Steel*, v. 18, Sept. '45, pp. 417-420.
Comparative effect of carbon and nitrogen on intergranular corrosion.

3-186. **High Silicon Aluminum Alloys—Their Casting and Heat Treatment.** F. A. Allen. *Light Metals*, v. 8, Sept. '45, pp. 431-434.
Development, theory, and foundry techniques for the successful use of the eutectic aluminum-silicon alloys. Comments upon the modification process.

3-187. **The Machinability of Metals.** J. Stoney. *Machinery* (London), v. 67, Sept. 6, '45, p. 276.
Heat treatment; quenching; the use of C, S, P, and Mn in steel; hardness due to cold-working.

3-188. **Structural Changes in Carbon and Molybdenum Steels During Prolonged Heating at 900 to 1000° F.** G. V. Smith, R. F. Miller and C. O. Tarr. *Combustion*, v. 17, Sept. '45, pp. 41-44. Also *Steel Processing*, v. 31, Sept. '45, pp. 582-584.
Results of investigations on three carbon and six molybdenum steels at temperatures from 900 to 1100° F. over periods ranging up to 5000 hr., each being tested in both annealed and normalized conditions and their hardness and microstructure observed. Rate of spheroidization was greater in the normalized steels, but less marked in the carbon steels. Graphite formed in all the carbon steels, but only in those molybdenum steels to which aluminum had been added.

3-189. **Magnesium Today.** Thur Schmidt. *Modern Metals*, v. 1, Oct. '45, pp. 4-6.
Wartime magnesium applications and points out definite advantages of magnesium. Cautions fabricators about wishful thinking and avoidance of misapplications.

3-190. **Wrought Magnesium—Alloys, Properties, Fabrication and Uses.** E. S. Bunn. *Metal Progress*, v. 48, Oct. '45, pp. 708-712.
Alloying elements; commercial wrought alloys; fabrication methods; physical properties; design characteristics.

3-191. **Effects of Boron in Steel.** R. B. Corbett and A. J. Williams. *Iron Age*, v. 156, Oct. 11, '45, pp. 54-57.
Study of the properties imparted to steels by boron additions led to the conclusion that the most important effect of the proper use of boron is to increase the hardenability of steel that is used in the quenched condition without tempering or with only slight tempering. Neither the hardness nor any other property of a steel is materially improved by treatment with boron if the steel is normalized. (Bureau of Mines Report of Investigations 3816.)

3-192. **Characteristics of Wrought Aluminum Alloys.** Owen Lee Mitchell. *American Machinist*, v. 89, Oct. 11, '45, pp. 99-105.
Factors involved in selection of wrought aluminum alloys for a specific product vary widely with deviations in the end use and the manufacturing steps in its fabrication.

3-193. **Relative Curvature Controls Gear Tooth Surface Strength.** Ernest Wildhaber. *American Machinist*, v. 89, Oct. 11, '45, pp. 118-121.
Indicates that magnification of small tooth surface portion gives simple basis for a broader analysis.

3-194. **The Strength of Alclad D.T.D. 390.** I. G. Bowen. *Aircraft Engineering*, v. 17, Aug. '45, pp. 240-241.
Proportionality limit; 0.1% proof stress; 0.2% proof stress; 0.5% proof stress; ultimate tensile strength; elongation on 2 in.

3-195. **Low Temperature Behavior of Ferritic Steels.** *Iron Age*, v. 156, Oct. 4, '45, pp. 69-71, 154, 156, 158.
Guns and armor sometimes have to operate at −50° F.; aircraft may operate at temperature approaching −100° F., and in equipment for low temperature processing of petroleum products and synthetic rubber, for example, temperatures of −300° F. or below may be required. The engineering questions raised by the low temperature behavior of steels gave rise to a research program under War Metallurgy Committee guidance. Results of experimental work on effect of composition, heat treatment, grain size, and hardenability summarized for both NE and SAE steels. Low temperature behavior of NE steels is equivalent to that of NE provided an equally fine-grained, equally hardenable steel is used.

3-196. **Aluminum Alloy R303.** Paul P. Zeigler, L. E. Householder and H. N. Logsdon. *Iron Age*, v. 156, Oct. 4, '45, pp. 74-78.
New high strength alloy, with a well-balanced set of mechanical and general corrosion resistant properties, will likely find many postwar applications. Physical properties, heat treatment, etching techniques, corrosion characteristics, and formability are all described.

3-197. **"Kumium."** *Machinery* (Lloyd), v. 17, Sept. 1, '45, p. 69.
Heat treatable corrosion resisting copper-chromium alloy has a wide range of physical properties.

3-198. **Which Steel Shall I Use?** H. W. Gillett. *Machine Design*, v. 17, Oct. '45, pp. 101-108.
Deals with the frame of mind in which the machine designer should seek information regarding what steel to use. Discusses how section size influences characteristics; stress gradient falls sharply; boron-treated steels improve hardenability; fine-grained steels are tougher; hardenability should be specified.

3-199. **Cast Nickel Alloy Steels. (Materials Work Sheet.)** *Machine Design*, v. 17, Oct. '45, pp. 167-172.
ASTM specifications; properties prescribed in ASTM specifications; characteristics; applications; fabrication; heat treatments; resistance to corrosion.

3-200. **Effect of Exhaust Gases on Stainless Steel Manifolds.** Wilson G. Hubbell. *Automotive Industries*, v. 93, Sept. 15, '45, pp. 30-32, 67-68.
As a result of the conflicting information available concerning the effect of stabilizing and stress relief heat treatment upon welded 18-8 stainless steel, series of investigations was made on this subject. Determines the particular benefit, if any, which might be imparted by these processes to 18-8 types 321 and 347 stainless steels for use on exhaust manifolds. Benefits which would be reflected in greater serviceability of the aircraft exhaust manifolds manufactured from this steel were of prime importance to this inquiry.

3-201. **Beryllium-Copper—Some Processing Characteristics.** George H. Slagle. *Metals & Alloys*, v. 22, Sept. '45, pp. 731-734.
Some suggestions for specifying and fabricating beryllium-copper, based on years of practical experience with the alloy.

3-202. **New Uses for Cerium.** G. Ahrens. *Metals & Alloys*, v. 22, Sept. '45, pp. 748-750.
Applications of cerium for making stronger, better aluminum and magnesium parts and other engineering materials.

3-203. **Metallurgical Aspects of the Failure of Colliery Haulage and Winding Gear.** J. H. Woodhead. *Iron & Coal Trades Review*, v. 150, no. 4027, May 4, '45, pp. 659-664, 674. *Engineers' Digest* (American Edition), v. 2, Sept. '45, pp. 462-464.
Choice of materials for haulage and winding gear is limited by the necessity for good ductility and high resistance to shock combined with adequate strength. Ease of working by the blacksmith and absence of any necessity for complicated and critical heat treatment are also important. Mild steel containing about 0.1 to 0.15% carbon and 1.5% manganese has properties which make it an extremely good material for the construction of haulage and winding gear. This steel has an unusually high shock resistance and retains its mechanical properties well in service.

Materials Index

THE FOLLOWING tabulation classifies the articles annotated in the A.S.M. Review of Current Metal Literature according to the metal or alloy concerned. The articles are designated by section and number. The section number appears in bold face type and the number of the article in light face.

General Ferrous

1-46-47; **2**-107-108-109-111; **3**-195-198; **5**-50; **6**-134; **10**-81-82; **15**-32; **16**-134; **20**-434-445; **22**-564; **26**-140.

Cast Iron

14-314; **16**-130; **18**-229; **19**-293; **20**-434-444; **23**-256.

Cast Steel

2-110; **3**-199; **14**-297-309-312; **18**-244.

Wrought Carbon Steel

3-203; **4**-64-67-72; **6**-131; **18**-235; **19**-292-295-299-303.

Alloy Steel

3-188-199; **9**-115; **12**-215; **14**-298; **18**-230; **22**-551; **23**-260.

Stainless and Heat Resisting Steel

3-185-200; **6**-128; **19**-281; **20**-452; **22**-537-550; **23**-254.

Tool Steel and Carbides

3-204; **5**-51-52; **7**-221; **18**-239-253; **19**-298; **20**-451; **22**-536.

General Non-Ferrous

12-211; **14**-320; **22**-549-561; **26**-147; **27**-143-144.

Aluminum

3-181-186-192-194-196; **4**-68-70-71; **7**-230-235; **9**-118; **10**-80-83; **14**-307; **15**-34; **16**-128; **18**-231-236; **20**-466; **22**-531-539; **23**-245-248-256-259-269; **24**-88; **25**-112.

Magnesium

3-189-190; **6**-127-130; **7**-224; **8**-125; **14**-302-303-308-311-316; **19**-288-296; **20**-460; **23**-248-257-258; **24**-88; **26**-138-142.

Copper, Brass and Bronze

3-197-201; **4**-66; **14**-315-317; **19**-278; **26**-146.

Lead and Lead Alloys

6-135; **23**-244.

Tin and Tin Alloys

8-120; **26**-143.

Zinc and Zinc Alloys

2-105; **4**-66-70; **7**-231-234; **8**-122-128; **10**-79.

Miscellaneous and Minor Metals

1-42-43-44; **2**-106; **3**-182; **8**-127.

3-204. **How to Conserve Tool Steel and Obtain Longer Tool Life.** Robert C. Gibbons. *Steel*, v. 117, Oct. 22, '45, pp. 112-113, 150, 152, 154, 156-157.

Practical suggestions on selection of tool steels, design and preparation of tools, design of the part, method of manufacture and previous treatment of the metal machined.

4. STRUCTURE
Metallography and Constitution

4-63. **Trends in Metallurgy.** Gustav W. Pirk. *Wire & Wire Products*, v. 20, Oct. '45, pp. 758-761, 764-765, 768-770, 797.

Emphasizes increasing need for a more thorough understanding of fundamental scientific principles as applied to general problems without getting theoretical. Physical metallurgy is the common ground on which factory and laboratory should work out the problems of production.

4-64. **Constitution of Mild-Steel Arc-Weld Deposits.** H. A. Sloman, T. E. Rooney and T. H. Schofield. *Engineering*, v. 160, Aug. 31, '45, p. 197.

Investigation into the hydrogen content of weld metal to ascertain its origin and to make possible a control of the conditions, as far as hydrogen is concerned, under which weld metal is deposited. (From Institute of Metals.)

4-65. **The Technique of Macrography.** *Chemical Age*, v. 53, Sept. 1, '45, pp. 195-197.

Preparation of specimen by macro-etching.

4-66. **The Structure of Electrodeposited Copper-Zinc Alloys.** *Monthly Review*, v. 32, Sept. '45, pp. 880-886, 938.

Structures of the deposits over the whole range of copper-zinc alloys compared with the phase diagram for these alloys. Some information on the relationship between the properties of electrolytic and recrystallized alloys was obtained. 6 ref. (Prepared from a paper by E. Raub and D. Krause, *Zeitschrift für Elektrochemie*, v. 50, 1944, p. 91.)

4-67. **Constitution of Mild Steel Arc-Weld Deposits.** H. A. Sloman, T. E. Rooney and T. H. Schofield. *Engineering*, v. 160, Sept. 14, '45, pp. 217-220.

Determination of the hydrogen in weld metal; metallographic examination of welds. (From Institute of Metals.)

4-68. **Metallography of Alcoa 75S Alloy.** F. Keller. *Iron Age*, v. 156, Oct. 4, '45, pp. 64-68.

Use of zinc, magnesium and copper as major alloying elements in this high strength aluminum constructional alloy produces somewhat different microstructural characteristics than in other aluminum alloys. Etches and procedures for studying the microstructure of 75S, as well as a discussion of the more important microstructural features are given.

4-69. **Thermal Analysis.** *Metal Industry*, v. 67, Sept. 14, '45, pp. 169, 172.

Interpretation of cooling curves. 3 ref.

4-70. **Age Hardening of the Solid Solution Aluminum-Zinc.** J. Herenguel and G. Chaudron. *Revue de Metallurgie*, v. 41, no. 2, Feb. '44, pp. 33-41. *Engineers' Digest* (American Edition), v. 2, Sept. '45, pp. 446-448.

Study of solid solutions of aluminum-zinc made up from metals of very high purity. It was found that in this case age hardening takes place to a very considerable degree. An examination was also made of the effects of small additions of magnesium, iron and silicon to the high-purity alloy.

4-71. **The Constitution of the Aluminum-Rich Aluminum-Chromium Alloys.** G. V. Raynor and K. Little. Institute of Metals *Journal*, v. 71, Sept. '45, pp. 481-489.

Solid solubility curve for chromium in aluminum redetermined between the peritectic temperature and 350° C., using micrographic methods. Results are in good agreement with those which Koch and Winterhager obtained by X-ray methods, and with the micrographic results of Fink and Freche above 530° C. Composition of the phase which enters into equilibrium with the primary solid solution has been accurately established. It corresponds to the formula $CrAl_7$. 12 ref.

4-72. **Constitution of Mild Steel Arc Weld Deposits.** H. A. Sloman, T. E. Rooney and T. H. Schofield. *Engineering*, v. 160, Sept. 21, '45, pp. 238-240.

Constituents varied with the carbon and nitrogen contents and did not resemble lamellar pearlite in any of the deposits. Etching medium used for all the photomicrographs was a solution of nitric acid in alcohol. Shows the structure after heating at 940° C. for 15 min., followed by 26 days at 200° C. (Paper for Iron and Steel Institute.)

5. POWDER METALLURGY

5-44. **Metal Powders.** *Automobile Engineer*, v. 35, Sept. '45, p. 353.

Production methods and their advantages.

5-45. **Powder Metallurgy.** *Automobile Engineer*, v. 35, Sept. '45, p. 368.

Modern applications of an important technique. Cemented carbides; porous bearings; sintered iron parts; metallic friction materials.

5-46. **Alloy Welding Wire From Powder Metallurgy.** F. G. Daveler and P. H. Aspen. *Welding Journal*, v. 24, Sept. '45, pp. 842-844.

Alloy welding rod; synthetic rod production; early research; sintering; flux coatings; costs; future enterprise.

5-47. **Crystalline Titanium Nitride.** V. P. Remin Ufan. *Metallurgia*, v. 32, Aug. '45, pp. 160-162.

Production of crystalline titanium nitride by melting powdered material. Because of its hardness and resistance to wear, it may be used for some purposes in industry as a substitute for diamond. (*Vestnik Metalloprom.*, 1938, pp. 54-62.)

5-48. **Plastics Increase Powder-Metal Flow.** Harry L. Strauss, Jr. *American Machinist*, v. 89, Sept. 27, '45, p. 113.

Limitations upon part shape reduced by using a plastic as a liquid vehicle and then burning it off before final compacting.

5-49. **Powder Metal Machine Parts.** *Machine Design*, v. 17, Oct. '45, pp. 133-136.

Emphasizes custom-made parts—those produced to the customer's specifications—and points out the disadvantages offered by powder metals in such applications.

5-50. **Powder Metallurgy Precision Parts.** R. Hradecky and Richard P. Seelig. *Iron Age*, v. 156, Sept. 27, '45, pp. 50-54, 132.

Explores the postwar possibilities of new techniques, new products and new powder alloys and mixtures. Since one of the most fertile fields for this process is that of magnetic parts, a new sintered iron has been developed. This material is described and its coercive force and maximum permeability plotted.

5-51. **Tungsten Carbide Machine Parts.** S. H. Brams. *Iron Age*, v. 156, Sept. 27, '45, pp. 55-57.

Increase in manufacturing facilities and the concomitant reduction in price make possible the application of tungsten carbide as a metal for fabrication in addition to its former use as a cutting tool. Experiments have proved that tungsten carbide can be successfully used for machine parts subject to considerable wear. Results of such trials at the Carboloy Co. plant are reported and new uses for the material suggested.

5-52. **Sintered Carbide Die Insert.** *Steel*, v. 117, Oct. 22, '45, pp. 111, 126.

Multiplies by 10 to 1000 the number of pieces produced per grind.

6. CORROSION

6-124. **Piston Lacquering—Its Causes and Cure.** H. C. Mougey. *SAE Journal*, v. 53, Oct. '45, pp. 582-587.

Formation of varnish or lacquer deposits on pistons and other engine parts is closely related to the formation of sludge deposits. Problems divided into three classes: Low temperature, intermediate temperature, high temperature. Cause of the low-temperature sludges is water, and varnish is usually not a serious problem at the low temperatures. Cause of the intermediate-temperature sludges appears to be the fuel and in some cases the oil, and varnish may be serious at the intermediate temperatures.

6-125. **Fuel Economy Discussions, VI.** W. Murray. *Chemical Age*, v. 53, Sept. 8, '45, pp. 215-219.

Inhibition of corrosion of metal in contact with water or steam. Electrolytic corrosion theory; typical examples of corrosion; examples of successful inhibition; present water treatment practice; the future.

6-126. **Corrosion Tests Yield Interesting Data.** *Railway Age*, v. 119, Oct. 13, '45, pp. 594-597.

Thousands of specimens of metals, alloys and coatings studied at Kure Beach. Methods of timber preservation also investigated to determine resistance to marine borers.

6-127. **Magnesium for Cathodic Protection.** Arthur Smith. *Modern Metals*, v. 1, Oct. '45, pp. 22-23.

How corrosion occurs and how anodes are produced, positioned, etc., to combat galvanic corrosion.

6-128. **Corrosion Resistance of the Stainless Steels.** Carl A. Zapffe. *Metal Progress*, v. 48, Oct. '45, pp. 693-696, 697-707.

Definitions of stainless steels and passivity; effect of condition of the steel; resistance to acids; resistance to strong bases and other media; galvanic corrosion; erosion-corrosion. Tables of specific data on corrosion rates of various steels in various corroding media.

6-129. **How to Protect Motor and Machine Components.** L. G. Klinker. *Iron Age*, v. 156, Oct. 15, '45, pp. 64-68, 176B.

Types of corrosion problems encountered and the means developed to minimize failures and deterioration.

6-130. **The Acid Corrosion of Magnesium.** G. E. Coates. Institute of Metals *Journal*, v. 71, Sept. '45, pp. 457-480.

Corrosion rate of magnesium in dilute acids has been measured by a flow method; over wide ranges the logarithm of the corrosion rate is linearly proportional to the logarithm of the acid concentration. Measurement of the concentration-polarization properties of the same acids, and a comparison of these with corrosion rate data, are taken to confirm the diffusion control mechanism and lead to a quantitative interpretation of acid corrosion rates. The potentials of magnesium during acid corrosion have also been measured, but, although qualitatively explained as the sum of the two terms hydrogen overvoltage and concentration polarization, no exact interpretation has been obtained. 22 ref.

Metal Literature Review—*Continued*

6. CORROSION (*Cont.*)

6-131. **Stress Corrosion Cracking of Mild Steel.** *Sheet Metal Industries*, v. 22, Sept. '45, p. 1562.

Theory of stress corrosion; correlation between aging and stress corrosion; effect of nitrogen; experimental procedure. (Electrochemical Society.)

6-132. **The Canning Method for Preserving Ordnance.** *Corrosion and Material Protection*, v. 2, Oct. '45, pp. 7-9, 14.

Canning guns and other large weapons to preserve them for future use. An entire weapon such as a 90-mm. anti-aircraft gun is placed in a huge metal can and hermetically sealed. The air is exhausted and an inert gas such as nitrogen or helium used to replace it, along with the desiccant silica gel. This system permits the storage of weapons or other articles indefinitely without the necessity of frequent inspections.

6-133. **The Factor of Corrosion in the Cleaning and Processing of Metals.** S. G. Thornbury. *Corrosion and Material Protection*, v. 2, Oct. '45, pp. 15-16, 29.

Two basic causes of corrosion as a result of the cleaning process must be considered. Corrosion may result from a direct chemical reaction between the cleaning agent and the metal being treated, or it may result from an electrolytic reaction between two or more metals, in which the cleaning solution acts as an electrolyte. In both cases, corrosion can be altogether prevented or held to a minimum if the chemical and electrolytic behavior of the metal being treated and the cleaning compound are clearly understood.

6-134. **Potential Curves for Iron in Hydrochloric Acid.** Robert D. Misch and Hugh J. McDonald. *Corrosion and Material Protection*, v. 2, Oct. '45, pp. 17-20.

Examination of the results for each concentration shows that in all cases the potential is highest (more negative) at the end of a trial for the acid solution as made up and lowest for the solution in which oxygen was bubbling. The curve for the oxygen saturated solution lies in an intermediate position. The average values for the e.m.f. at 3000 sec. (50 min.) after immersion for each trial are given.

6-135. **Corrosion of Lead by Oxidizing Agents and Lauric Acid in Hydrocarbon Solvents.** C. F. Prutton, David Turnbull and D. R. Frey. *Industrial & Engineering Chemistry* (Industrial Edition), v. 37, Oct. '45, pp. 917-924.

Rates of corrosion of pure lead by representative organic peroxides in hydrocarbon media containing organic acids are compared. Organic oxidizing agents other than peroxides or oxygen may be effective in causing corrosion of lead in these media; oxy-nitrogen compounds, quinones, and diacetyl are agents of this type. Reactivities of oxidizing agents toward lead are compared at a constant acid concentration. To evaluate the effective corrosivity of an oil, it is necessary to consider the thermal stability of the oxidizing agent as well as its chemical reactivity. Evidence is cited to show that oxy-nitrogen compounds, as well as peroxides and oxygen, may be among the oxidizing agents present in oils.

7. CLEANING AND FINISHING

7-219. **The Effect of Chemical Surface Treatments on the Scuffing of Gears.** H. D. Mansion. *Engineering*, v. 160, Aug. 31, '45, pp. 178-180.

After the deep phosphate treatment had been investigated, a pair of gears was given a shallow phosphate treatment, and the corresponding results are shown. Gears were then run for 1 hr. at the running-in load, measured and photographed again. Afterwards they were run for another 99 hr., measured and photographed once more. They were finally subjected to a standard scuffing test. Tests considered individually and characteristics given.

7-220. **Infra-Red Lamps Speed Finish Baking.** *Aero Digest*, v. 51, Oct. 1, '45, pp. 80, 92.

Applications in which the finishes baked give off volatiles with flash points so low as to constitute a real hazard. Volatiles with a flash point below 100° C. present a hazard regardless of whether the heat source is a lamp, lens, metallic or ceramic surface, open flame or electric arc.

7-221. **Calculatory Methods for the Economic Repolishing of Sintered Carbide Dies.** P. Grodzinski. *Wire Industry*, v. 12, Sept. '45, pp. 469-470.

Problem of how much should be removed in radial and axial directions can be partly solved by mathematical treatment. Further problem is to provide the necessary means for measuring and adjusting the machines, as well as tables and nomograms to help the operator. Deals mainly with the calculatory side of the problem.

7-222. **Cleaning and De-Whiskering Nails.** N. Ransohoff. *Wire & Wire Products*, v. 20, Oct. '45, pp. 733-734, 810.

New method described.

7-223. **Pickling With Submerged Combustion.** H. N. Snowden. *Wire & Wire Products*, v. 20, Oct. '45, pp. 750-751.

Presents the results obtained in using direct fired equipment for the purpose of heating and agitating acid pickling tanks.

7-224. **Fundamentals of Finishing Magnesium.** *Modern Metals*, v. 1, Oct. '45, pp. 26-28.

Information as to types of finishes to be used for specific peacetime applications.

7-225. **Soft-Grit Blasting of Metals.** E. C. Lathrop and S. I. Aronovsky. *Compressed Air Magazine*, v. 50, Oct. '45, pp. 268-272.

"Soft-grit" blasting process for removing hard, thick carbon deposits from cylinders and pistons of aircraft engines has resulted in considerable savings in man-hours. Process is almost fool-proof, since properly chosen soft grits do not change the dimensions of the objects, and no masking or hand tools are required.

7-226. **Metal Cleaning, Finishing, Protection—a Symposium.** *Metal Progress*, v. 48, Oct. '45, pp. 957-969.

Process engineering of surface conditioning and finish, by George Onksen. Blast cleaning of metal, by A. L. Gardner. Surface preparation of cast iron, by J. H. Shoemaker. Improvements in zinc and nickel coatings, by Myron B. Diggin. Improvements in other protective metallic plates, by R. B. Saltonstall. Oxide finishes on copper, steel and aluminum, by Walter R. Meyer. Chromate finishes on zinc, cadmium and magnesium, by R. M. Thomas.

7-227. **Metallizing—A Maintenance Tool.** *Iron & Steel Engineer*, v. 22, Sept. '45, pp. 46-47.

Cost savings are effected by reclaiming worn parts, but even more important, particularly in the drive of war production, are the applications that have enabled large production units to get back into operation without long delays which would have occurred had the process not been used. Summarized are several of these cases.

7-228. **Final Cleaning and Painting.** Walter J. Brooking. *Canadian Metals & Metallurgical Industries*, v. 8, Sept. '45, pp. 25-29, 47.

Elements which make final cleaning and painting departments important; special problems of a cleaning and painting department supervisor; other departmental help for the cleaning and painting foreman; margins of efficiency in a cleaning and painting department.

7-229. **Die Castings Can Be Colorful.** *Die Casting*, v. 3, Oct. '45, pp. 42-43.

Recently developed finishes now make it possible to combine all the elements of "styling" into a metal product which still provides many advantages over other methods of production. The smooth die cast surface with proper pretreatment is an ideal base for subsequent finishing for appearance and protection.

7-230. **Anodizing of Aluminum Alloys.** Raymond J. Kwasnik. *Die Casting*, v. 3, Oct. '45, pp. 64-66.

Considers the popular alloys used in die castings, numbers 13, 43 and 360, containing 12%, 5% and 9.5% of silicon respectively. Alloys degreased and given a caustic treatment become covered with a powdery smut that cannot be removed by the 30% nitric acid dip. They anodize poorly, their dielectric is low and the surface is both unsightly and covered with a smudge. The dyeing properties are poor, the product dusty. Technique to be observed given.

7-231. **Chemical Treatments for Zinc Alloy Die Castings. Part II. Black Nickel Salts.** *Die Casting*, v. 3, Oct. '45, pp. 76-79.

Includes several types of black finishes, containing nickel salts, that are produced by either simple immersion or as a result of electrolytic action.

7-232. **Animal Glue in Abrasive Processes.** H. B. Sweatt. *Metal Finishing*, v. 43, Oct. '45, pp. 415-416.

Storage and preparation; wheel set-up; wheel drying; manufacture of glue.

7-233. **Metals, Finishes, and Finishing.** Edward Engel. *Iron Age*, v. 156, Sept. 27, '45, pp. 65-68.

Data on infra-red drying time, tinting and hiding power of white pigments, luminescent coatings, testing equipment and procedure for metal finishes.

7-234. **The Technique of Sheet Galvanizing by the Hot Dip Process.** Harold Edwards. *Sheet Metal Industries*, v. 22, Sept. '45, pp. 1546-1552.

Deals mainly with the galvanizing of mild steel sheets by the hot dip process, which is divided into two major operations. The preparation of a clean metallic surface and the coating of the prepared surface with zinc. Pickling equipment and practice. 10 ref.

7-235. **The Brittleness of the Enamel of Coated Aluminum Wire at Normal and Higher Temperatures.** E. Greulich. *Elektrotechnische Zeitschrift*, no. 17-18, May 6, '45, pp. 241-242. *Engineers' Digest* (American Edition), v. 2, Sept. '45, pp. 453-455.

Difficulties in the production of enamel-coated aluminum wire are due to the propensity of the coating to become brittle if the wire is stored for any length of time. The adhesion between the enamel and the metal core decreases and the wire becomes unsuitable for further use. If the assumption that the brittling of the enamel is due to the absorption of oxygen is correct, it was to be expected that the quality of the wire could be improved by using coatings of oilless artificial resins instead of the oil-containing enamel used hitherto. Validity of these assumptions, and the properties of wire with coatings of artificial resins were investigated in a series of tests carried out with aluminum wires of 0.9 to 1.1 mm. diameter produced from the same batch.

7-236. **Modern Metal Protection—a Symposium.** Allen G. Gray. *Steel*, v. 117, Oct. 15, '45, pp. 116-120, 172, 174, 177-178.

Basis for comparison of several methods of metal protection is provided by data—properties, advantages and limitations and general possibilities for several types of corrosion protecting finishes.

8. ELECTROPLATING

8-119. **The Adhesion of Electrodeposits, I.** A. L. Ferguson and Elmer F. Stephan. *Monthly Review*, v. 32, Sept. '45, pp. 894, 897, 898, 901-902, 905-906.

Some of the papers in the bibliography are devoted practically entirely to a study of methods for measuring the adhesion of electrodeposits, some contain extensive information on this subject along with other material, but in more papers the subject of adhesion is merely incidental, and the only connection with adhesion may consist in stating the methods used.

8-120. **Electro-Tin—Protective Value as an Under-Coating.** S. Wernick. *Metal Industry*, v. 67, Sept. 28, '45, pp. 202-204.

Cadmium ordinarily deposits fairly uniformly on steel surfaces, but it was found that the proportion of metal which reached recesses in intricate shaped components was insufficient to provide the necessary protection even though the thickness of deposit applied was much increased above the normal. The provision of an electro-tin undercoating from a solution, the throwing power of which was superior to that of the cadmium cyanide electrolyte, considerably improved the protective effect of the subsequent coating of cadmium.

8-121. **The Electrodeposition of Metals on Plastics.** Harold Narcus. Electrochemical Society, Preprint, 88-5, 45 pp.

Purposes of metallizing a plastic article are to render it a suitable substitute for critical and strategic metals and to produce a finished article which has the inherent properties of the plastic in addition to the desired properties of the deposited metal. By plating on a plastic its tensile, impact, and flexural strength and its resistance to distortion from heat are increased and its water absorption is decreased. Because of the absence of electrolytic effects, due to basis metals that accelerate corrosion, a metallic coating on a plastic material is more resistant to corrosion than when applied to a basis metal. Thickness of the silver film is controllable and measurable using either the direct or the optical methods, preferably the former.

8-122. Current Zinc Electroplating Practice. Allen G. Gray. *Steel*, v. 117, Oct. 8, '45, pp. 108-109, 158, 161, 162, 164, 166, 170.
Character and life of plated coatings; acid and cyanide baths; bath formulas; operating conditions.

8-123. Racking. J. L. Vaughan and I. A. Usher. *Metal Industry*, v. 67, Sept. 14, '45, pp. 170-172.
In a consideration of the practical aspects of hard chromium plating problems, gives a description of the racks and plating fixtures developed for a variety of work. (From *Canadian Metals & Metallurgical Industries.*)

8-124. Heating and Agitating Small Tanks. P. J. Lo Presti and H. Bandes. *Metal Finishing*, v. 43, Oct. '45, pp. 406-407.
Reflector drying infra-red heat lamps as heaters for glass plating tanks.

8-125. The Treatment of Magnesium and Magnesium Alloys. George B. Hogaboom. *Metal Finishing*, v. 43, Oct. '45, pp. 408-410.
Amount of research done on protection of magnesium as evidenced by the number of patents issued. List of 87 patents is appended, with claims abstracted for 13 patents. These cover the most significant points of the surface treatment of magnesium and its alloys.

8-126. Fundamentals of Science Relating to Electroplating. *Metal Finishing*, v. 43, Oct. '45, pp. 410-411, 439.
Corrosion and its various forms.

8-127. Electrolytic Methods of Polishing Metals. IX. Rhodium Plating. S. Wernick. *Sheet Metal Industries*, v. 22, Sept. '45, pp. 1586-1592.
Electrolytes; comparison of sulphate and phosphate electrolytes; preparation of plating solutions; rhodium sulphate; rhodium phosphate; complex rhodium electrolyte. 11 ref.

8-128. Current Zinc Electroplating Practice. Allen G. Gray. *Steel*, v. 117, Oct. 22, '45, pp. 129-130, 132, 134.
Fundamental chemistry of cyanide type zinc baths and data on the zinc-mercury process and "bright" zinc plating.

9. PHYSICAL AND MECHANICAL TESTING

9-114. The Effect of Hammer Blows on Welds Containing Cracks and/or Inclusions. Elmer A. Ratzel. *Welding Journal*, v. 24, Sept. '45, pp. 455s-458s.
Results of a test designed to determine qualitatively the effect of hammer blows on a welded specimen having a known (deliberately made) initial defect indicate that the value of the hammer test of welded pressure vessels to uncover defects is questionable.

9-115. Micro-Mechanical Testing of Metals. N. Mironoff. *Welding*, v. 13, Sept. '45, pp. 352-354.
New type of apparatus for carrying out alternating bending tests on metals. Apparatus is suitable for testing welds, and results are given of tests conducted on a welded chromium-molybdenum steel specimen.

9-116. Sources of Error in Diamond Pyramid Hardness Measurements on Hardened Steel. W. N. Hindley. Iron & Steel Institute, Advance copy, Sept. '45, 10 pp.
Extent to which the results of diamond pyramid hardness (H_D) tests carried out by independent observers on hardened steel could be relied upon, experience having shown that some observers reported widely different results on material of the same nominal composition and heat treatment. Conclusions apply generally to all hardness testing. As materials or components are sometimes accepted only to a given H_D specification, it is important that the H_D figures obtained should be reliable. Wide variation in the results reported by independent observers was found, although results within close limits of agreement were obtained on the same samples by an experienced observer, when care was taken in the preparation of the flats. The wide variations obtained are attributed to carelessly prepared flats, and a standardized procedure for surface preparation is therefore recommended.

9-117. Fridman's Theory of Strength of Materials. G. Stanley Smith. *Metallurgia*, v. 32, Aug. '45, pp. 163-171.
Elastic deformation; transition from elastic to plastic deformation; plastic deformation; conditions of failure; failure from normal stresses (rupture); failure from tangential stresses (shear); unified theory of strength and the diagram of mechanical state.

9-118. Electrical Conductivity as Measure of Hardness in Cold-Aged Aluminum Alloys. *Automotive Industries*, v. 93, Sept. 15, '45, pp. 34-35, 76.
In non-destructive methods of testing materials by magnetic induction, electric conductivity is used to classify the material and its condition. Conductivity measurement shows differences between various alloys and between various states of a given alloy, provided the alloys or conditions compared differ in conductivity. If the change in conductivity resulting from thermal or mechanical treatment has been ascertained, it can be used to identify the treatment. Further, it can be employed for the indirect determination of any other regularly related property. Instance of the foregoing is the indirect determination of the hardness of cold-aged aluminum alloys.

9-119. Rolling of Metals: Theory and Experiment. V. Yield Stress and the Criteria of Yielding. L. R. Underwood. *Sheet Metal Industries*, v. 22, Sept. '45, pp. 1535-1545.
Determination of yield stress by means of tension tests; compression tests; factors affecting the yield stress in cold rolling; factors affecting the yield stress in hot rolling; summary of the factors affecting the yield stress in cold and hot rolling; distinction between yield stress and specific roll pressure. 46 ref.

9-120. Calculating Bend Allowances. J. B. Clegg. *Sheet Metal Industries*, v. 22, Sept. '45, pp. 1575-1577.
System based on practical investigations into the variable factors due to strain.

10. ANALYSIS

10-79. A Ferrocyanide-Ceriometric Method for the Determination of Zinc in Ores. J. P. Mehlig and J. K. Clauss. *Chemist Analyst*, v. 34, Aug. '45, pp. 52-54.
Method for zinc in ores, based upon the precipitation of potassium zinc ferrocyanide by an excess of standard potassium ferrocyanide solution and titration of the excess with standard ceric sulphate solution. 9 ref.

10-80. Determination of Iron in High Silicon Aluminum-Base Alloys. Louis Silverman, Anita Yunker and Anne Gearing. *Chemist Analyst*, v. 34, Aug. '45, pp. 57, 59, 62.
Copper powder reduction method. 2 ref.

10-81. Colorimetric Determination of Molybdenum in Iron and Steel. Mitchell Kapron and Paul L. Hehman. *Industrial & Engineering Chemistry* (Analytical Edition), v. 17, Sept. '45, pp. 573-576.
Photometric method for determining molybdenum in ferrous metal employs water-soluble solvents of low volatility which produce a very stable molybdenum-thiocyanate complex color without the necessity for extraction. Interferences and their elimination, as well as the precision and accuracy of the method. 9 ref.

10-82. Spectrographic Analysis of Iron and Steel. H. F. Kincaid. *Western Metals*, v. 3, Sept. '45, pp. 11-15.
To analyze fabricated iron and steel a universal spectrographic technique is needed. This requirement is fulfilled with a commercial grating spectrograph and the use of the flat surface method of sampling. Technique used.

10-83. Aluminum and Titanium. J. Davis and L. J. Holton. *Metal Industry*, v. 67, Sept. 21, '45, pp. 178-180.
Details concerning the dissolution of the sample, preliminary separation of most of the heavy metals, conditions for electrolysis and the final estimation of aluminum and titanium. Concludes by naming the advantages claimed for these methods.

10-84. Chromatographic Methods in Inorganic Micro-Analysis. J. H. Beaucourt and D. L. Masters. *Metallurgia*, v. 32, Aug. '45, pp. 181-184.
Indicates briefly the development and principles of the technique; describes how it may be applied to inorganic problems. Since chromatography, regardless of its field of application, is necessarily restricted to the manipulation of small quantities of material, it may be regarded essentially as a micro method.

11. LABORATORY APPARATUS, INSTRUMENTS

11-76. A Simple Magnetic Tester for Determining the Thickness of Coatings on a Steel Base. E. S. Spencer-Timms. Electrodepositors' Technical Society *Journal*, (Preprint), v. 20, '45, pp. 139-146.
Description of tester; method of use; calibration; reproducibility; summary of limitations of the instrument. 4 ref.

11-77. Stresses and Strains Determined by Bonded Resistance-Wire Strain Gage. *Steel*, v. 117, Sept. 24, '45, p. 143.
Bonded resistance-wire strain gage used in determining stresses in aircraft.

11-78. Fundamentals of the Electronic Valve. J. R. Cornelius. *Machinery* (London), v. 67, Sept. 6, '45, pp. 259-265.
Electronic tube or valve can be extremely useful to the mechanical engineer in many ways: For the safeguarding of machine tools, for human safety and against mechanical breakdown; the research into mechanical and electrical disturbances occurring in rapidly-moving machinery; unusual deflections in structures that appear perfectly rigid and solid; micro-measurement both of transient and static nature; and the use of high frequency cupolas and furnaces for the smelting and welding of difficult materials. Deals only with the electronic devices available to industry.

11-79. A New Coating Thickness Gage. S. Lipson. *Monthly Review*, v. 32, Sept. '45, pp. 888-892, 936.
Coating thickness measuring instrument for non-magnetic coatings on steel.

11-80. The Thyratron and Cathode-Ray Tubes. J. R. Cornelius. *Machinery* (London), v. 67, Sept. 13, '45, pp. 289-291.
Deals with two types of electron tubes of great use to the engineer.

11-81. Electron Microscopic Investigation of Surface Structure. Robert D. Heidenreich. *SAE Journal*, v. 53, Oct. '45, pp. 588-594.
Technique applicable to the study of the surfaces of rigid solids. Includes examples of structure of the bulk material as revealed by suitable etching techniques (metallography), and structure of the surface regions as they affect such factors as friction and wear, corrosion, adhesion of paints, and surface films.

11-82. Dimensional Control to Millionths. Richard Y. Moss. *Iron Age*, v. 156, Oct. 4, '45, pp. 79-81, 160.
Plunger and bushing manufacture for fuel injection equipment on the engines of B-29s late in the war was and is the most precise operation yet performed in mass production. Each grinding machine, equipped with flow-type air gaging equipment, turns out parts in quantity to a dimensional tolerance of 5 millionths of an inch.

11-83. Photo-Grids. Frank Hewlett. *Aircraft Production*, v. 7, Sept. '45, pp. 425-427.
Measuring flow and stretch in metal specimens and parts; sensitization of material.

11-84. Electron Microscopy. *Aircraft Production*, v. 7, Sept. '45, pp. 451-453.
Advances in laboratory equipment for the examination of metals.

11-85. A New Coating Thickness Gage. S. Lipson. *Metal Finishing*, v. 43, Oct. '45, pp. 412-414.
New coating thickness gage which employs the electromagnetic principle for determining the thickness of non-magnetic coatings on steel. Principle of operation is given.

11-86. Some Production and Maintenance Instruments. Clyde S. Cassels. *Iron & Steel Engineer*, v. 22, Sept. '45, pp. 97-100.
Instruments which have found considerable application in manufacturing plants: Profilometer; pneumatic comparator; gage for measuring moisture content of wood; the Strobotac, combination of stroboscope and tachometer.

11-87. Gages for Quality Control. R. M. Hays. *Western Machinery & Steel World*, v. 36, Sept. '45, p. 417.
Their use and care—cylindrical plug gages.

11-88. Instruments for Measuring Dimensions. *Metal Progress*, v. 48, Oct. '45, pp. 991-996.
A general review, by Orlan W. Boston. Rules, micrometers and calipers, by H. D. Hiatt. Comparators, by W. H. Baker.

11-89. Instruments to Establish Identity. *Metal Progress*, v. 48, Oct. '45, pp. 997-1003.
Magnetic comparators, by J. J. Smith. High frequency devices, by Patrick E. Cavanagh.

Metal Literature Review—*Continued*

12. INSPECTION AND STANDARDIZATION

12-207. **Quality Control During Production of Electric Resistance Welded Tubing.** Sidley O. Evans. *Welding Journal*, v. 24, Sept. '45, pp. 805-810.

Tests performed to maintain weld quality so consistently that the rejections resulting from couponing and hydrostatic testing each length of pressure tubing have averaged less than 0.3% of the tubes tested month after month. The effectiveness of these tests depends not so much on the remarkable features of any one test as on the coordination of the group of tests to the characteristics of the mill.

12-208. **Considerations Involved in Establishing a World Standard for Screw Threads.** William T. Taylor. *Aero Digest*, v. 51, Oct. 1, '45, pp. 68-70, 109, 113.

Optimum helix angle; crest and root design; various thread forms; effecting interchangeability; application of various threads.

12-209. **Magnetic Particle Testing.** E. H. Horstkotte and S. L. Rizzo. *General Electric Review*, v. 48, Oct. '45, pp. 24-30.

Quickly applied method of non-destructive testing reveals hidden flaws during manufacturing operations.

12-210. **"H" Steels and Their Specification.** L. E. Ekholm. *Metal Progress*, v. 48, Oct. '45, pp. 673-683.

Conditions for standard hardenability specifications. Chemical compositions of "H" steels are given—that is, steels melted to definite hardenability limits. Tentative hardenability bands are reproduced for 62 steels.

12-211. **Impact of War on Non-Ferrous Specifications.** Carter S. Cole. *Metal Progress*, v. 48, Oct. '45, pp. 684-692.

What after-effect will wartime specifications, substitutions and down-grading have. Aluminum and magnesium; copper; tin; zinc.

12-212. **Drawing Specifications.** H. J. Griggs. *Aircraft Production*, v. 7, Sept. '45, pp. 444-445.

Consideration of rational specification and requirement in surface finish.

12-213. **Quality Control, Part IV.** J. K. E. Cox. *Canadian Metals & Metallurgical Industries*, v. 8, Sept. '45, pp. 20-24, 47.

Radiography; X-rays and radiographs; sensitivity of radiography and the establishing of a radiographic technique; the interpretation of radiographs; development of foundry technique; laboratory design and equipment; safety precautions; routine system for the radiographic inspection of castings.

12-214. **Radiography as a Control of Quality in Die Castings. Part III.** Leo C. Kotraschek. *Die Casting*, v. 3, Oct. '45, pp. 68, 70, 72, 74.

Describes the operating principles of fluoroscopic equipment and includes specific recommendations for its efficient use.

12-215. **Progress Report on Hardenability Bands.** John Mitchell. American Iron and Steel Institute Yearbook, Advance Copy, 1945, 34 pp.

Pooling their wartime experience, consumers and producers of alloy steels have completed the first phase of a joint investigation of an improved method of specifying and testing various types of alloy steels. The method includes chemical analysis and approximates actual conditions of use. Both prewar and NE steels included.

13. TEMPERATURE MEASUREMENT AND CONTROL (PYROMETRY)

13-33. **A Completely Automatic Control of Open-Hearth Reversal.** B. M. Larsen and W. E. Shenk. *Western Metals*, v. 3, Sept. '45, pp. 54, 57.

Basic elements of the present control embrace one "maximum" and one "minimum" time relay and a potentiometer recorder-controller, combined with switches and relays.

13-34. **Effect of Material on Heat Transfer Rate.** *Machine Design*, v. 17, Oct. '45, pp. 163-166.

Includes formulas for determining over-all heat transfer rate, thermal conductivities of metals and alloys, commonly used for heat exchange, and charts facilitating the calculation of over-all rates.

13-35. **Time-Temperature Relationships in Work Pieces.** Victor Paschkis. *Industrial Gas*, v. 24, Sept. '45, pp. 15-17, 32, 34.

Report emphasizes working with extremely high temperatures and particularly skin temperatures up to 3000° F. Question of uniformity in individual pieces.

14. FOUNDRY PRACTICE AND APPLIANCES

14-297. **Some Production Control Principles and Their Application to the Manufacture of Steel Castings.** A. B. Lloyd. *Foundry Trade Journal*, v. 76, Aug. 30, '45, pp. 359-366.

Method of control is disclosed, which efficiently coordinates the commercial and manufacturing activities of a steel foundry.

14-298. **Low Alloy Steels.** Lester W. Gott. *Iron & Steel*, v. 18, Sept. '45, pp. 426-429.

Precision casting by the "lost wax" process. High speed production; intricate designs; new refractories used; molds baked; gravity pouring; production economies; mechanical properties; homogenizing heat treatment; limitations discussed.

14-299. **A Study of Molding Methods for Sound Castings.** Frederick G. Sefing. *Foundry Trade Journal*, v. 77, Sept. 13, '45, pp. 25-34.

Clean metal and gate design; position of gates and feeders; effective feeder design; feeder capacity; feeder connections; chills; venting mold cavities; porosity caused by hot spots.

14-300. **Pouring Light Metals.** Carl Wessel. *Light Metal Age*, v. 3, Sept. '45, pp. 17, 34.

Fundamental suggestions on pouring, drawn from practice, are important to the production of sound castings.

14-301. **The Literature of Die Casting.** James L. Erickson. *Light Metal Age*, v. 3, Sept. '45, pp. 25, 27, 29, 31.

Complete bibliography on die castings. 353 ref.

14-302. **Magnesium Ingots.** P. Menzen and W. Patterson-Rackwitz. *Metal Industry*, v. 67, Sept. 21, '45, pp. 185-186.

Continuous casting process with direct liquid cooling.

14-303. **Magnesium Die Castings.** Max Powell and C. H. Scott. *Product Engineering*, v. 16, Oct. '45, pp. 692-696.

Design data for magnesium die castings with factors that should be considered to obtain quality in product and economy in production. Features include parting line, draft, tolerances, stationary and movable cores, wall thickness, cast threads, machining allowances, ejectors, inserts, size and weight limitations, porosity and shrinkage.

14-304. **Mechanized Mold Preparation.** *Steel*, v. 117, Oct. 8, '45, pp. 107, 156.

Effects reduction in scrap and scarfing.

14-305. **Die Casting.** J. L. Erickson. *Metal Industry*, v. 67, Sept. 28, '45, pp. 194-197.

Transition from the first frail die casting machine to the mammoth piece of elaborate machinery existing today for this work is dealt with. Traces the reasons for the capability of machines with high injection pressures. Value of a high pressure machine does not lie in its ability to make superior small castings but merely in its ability to make large castings when small gates are used or to make small gates when multiple cavity dies are employed.

14-306. **Precision Founding—Part 8.** Francis Dittmar. *Iron Age*, v. 156, Oct. 11, '45, pp. 62-68.

Analyzes the use of refractory materials in several types of molds suitable for steel castings, and the operating factors involved in centrifugal casting.

14-307. **Alrok Treatment Avoids Masking Cast-In Inserts.** A. J. Ferko. *Iron Age*, v. 156, Oct. 11, '45, pp. 69-70.

Tests indicate that castings of aluminum alloys 40E, 195 and 356 with cast-in inserts need not have the inserts masked when given the Alrok treatment, as would be necessary in the case of the anodized treatment for passivation.

14-308. **Magnesium Ingots.** P. Menzen and W. Patterson-Rackwitz. *Metal Industry*, v. 67, Sept. 14, '45, pp. 165-166.

Continuous casting process with direct liquid cooling.

14-309. **High Tensile Steel for Castings.** W. West, C. C. Hodgson and H. O. Waring. *Foundry Trade Journal*, v. 77, Sept. 20, '45, pp. 47-52.

Analogies with forged steel provide useful pointers for progress. Plant and equipment; steel-making practice; hydrogen and flakes; control of inherent grain size; control of sulphide distribution; temperature measuring; facilitating repairs and maintenance. 8 ref.

14-310. **Working Under Pressure.** Nigel J. Collings. *Die Casting*, v. 3, Oct. '45, pp. 38-40.

By using unit cavity dies, parts inventory control is greatly facilitated. At the same time the production economies attained rapidly amortize die costs.

14-311. **Pumping Molten Magnesium.** M. M. Moyle. *Metals & Alloys*, v. 22, Sept. '45, pp. 716-720.

Practical use of newly developed equipment for pumping molten metals in foundries and ingot plants.

14-312. **Continuous Production of Steel Castings.** Gerald Eldridge Stedman. *Metals & Alloys*, v. 22, Sept. '45, pp. 735-741.

Advanced practice in the production of steel castings, as exemplified by the modern Pittsburg, Cal., foundry of Columbia Steel Co.

14-313. **Die Casting Methods in Germany Far Behind Those of U. S. and Britain.** A. T. Lillegren. *Steel*, v. 117, Oct. 1, '45, pp. 115, 164.

Finishing equipment; production rates; die cast materials.

14-314. **Iron Casting Runners and Feeding Heads.** T. Waterfall. *Machinery* (Lloyd), v. 17, Sept. 1, '45, pp. 70-74.

Jobbing iron foundry; cause of bad runners; area of mold; position of runners; top oreing; planning the runners; pouring precautions; rate of casting; influence of mass; distortion and internal stress; machining properties; area of runners; dimensions of runner system.

14-315. **Use of Insulating Pads and Riser Sleeves for Producing Sound Bronze Castings.** Howard F. Taylor and William C. Wick. *Foundry*, v. 73, Oct. '45, pp. 88-93, 158, 160, 164, 166, 168, 171, 175.

Emphasizes the dependence of good foundry practice upon proper gating and risering, and demonstrates how use of insulating pads and riser sleeves contributes to casting quality and operating economy. 6 ref.

14-316. **Trouble Shooting in the Magnesium Foundry.** Charles J. Scullin. *Foundry*, v. 73, Oct. '45, pp. 97-98, 200, 202.

Observing physical forces through artificial windows, ruby glass or something of that nature, it is possible actually to see what is occurring at the point where defect is found. This is especially effective in regard to the point of final coverage of a core.

14-317. **Small Brass Foundry Maintains Good Production.** Edwin Bremer. *Foundry*, v. 73, Oct. '45, pp. 104-105, 175-176, 178.

Production of 7000 to 8000 lb. of brass and bronze castings. Castings range from 1 oz. to 1000 lb. in weight, and, as a general rule, the larger castings are made by the night shift, since more room is available at that time. Description of equipment.

14-318. **Navy Yard Foundry Meets Peak Demands.** Pat Dwyer. *Foundry*, v. 73, Oct. '45, pp. 106-109, 180, 184, 186, 188.

Describes foundry operations at the Philadelphia Navy Yard.

14-319. **Foundry Research At International Nickel Co.** *Foundry*, v. 73, Oct. '45, pp. 110-113.

Facilities and activities.

14-320. **Metal Mold Castings.** D. Basch. *Metal Progress*, v. 48, Oct. '45, pp. 761-768.

Centrifugal and permanent mold castings, and three varieties of die castings—from basin machines, from cold chamber machines, and pressure molded casting machines. Alloy analyses; typical properties of die cast test bars; commercial tolerances; appraisal of relative characteristics.

15. SALVAGE AND SECONDARY METALS

15-32. **Steel Discard.** A. G. Arend. *Iron & Steel,* v. 18, Sept. '45, p. 415.
Much of the scrap shortly to come on the market, now that the need for war products has ceased, will be in a form needing only a moderate amount of work to render it usable in another shape. A prewar mill arranged for this work described.

15-33. **Scrapping, Storing and Salvaging War Tools.** Jack L. McGraw. *Modern Industrial Press,* v. 7, Sept. '45, p. 36.
Determining tools on hand; storing; salvaging.

15-34. **Navy Recovers Aluminum From Aircraft.** Donald L. Colwell. *Modern Metals,* v. 1, Oct. '45, pp. 8-12.
Disposal policy and technique for the billion or more pounds of aluminum from obsolete or "war weary" military aircraft has been subject to much speculation. Review of the over-all picture and the most logical solution of that problem.

15-35. **Turret Lathe Replaces Hand Tools in Deburring Steel Bushings.** *American Machinist,* v. 89, Oct. 11, '45, pp. 106-107.
Broken, four-flute end mills are salvaged and ground into V-notch cutters for the dual chamfering operations on the cut-off ends.

15-36. **Inexpensive Tube Benders Made From Salvaged Materials.** Andrew Brown. *American Machinist,* v. 89, Oct. 11, '45, pp. 108-109.
Non-strategic materials are used in their construction.

16. FURNACES AND FUELS

16-121. **Electrode Salt Baths.** *Automobile Engineer,* v. 35, Sept. '45, pp. 376-378.
Temperature range; general description; electrical equipment; dip-type pyrometer; operating data; multi-purpose use.

16-122. **Cleaning Blast-Furnace Gas.** *Coke and Smokeless-Fuel Age,* v. 7, Sept. '45, pp. 169-171, 182.
Recent American experience discussed with reference to the use of both the wet and dry methods.

16-123. **The Distribution of Materials in the Blast Furnace, Part I.** H. L. Saunders and R. Wild. Iron & Steel Institute, Advance copy, Sept. '45, 28 pp.
Distribution of materials in the blast furnace has been studied by the aid of small-scale models, using materials of correspondingly small size. The nature and extent of segregation depend upon the character of the materials, e.g., variation in size, shape, density, and moisture content, considered in relation to the furnace lines, bell and throat design, etc. Such variables are treated first singly and then in groups, the distribution patterns obtained being followed photographically. The form of the stock-line contour, which can be deduced from a knowledge of the trajectories, largely determines the initial distribution, which generally persists throughout the furnace shaft. Some examples of burden flow with spherical material are considered.

16-124. **Some Aspects of Electric Melting in the Foundry.** F. A. Rivett. *Foundry Trade Journal,* v. 77, Sept. 6, '45, pp. 3-10.
Some typical installations in ferrous and non-ferrous foundries. Arc furnaces; direct-arc furnaces; main application; steel; alloy irons; rocking indirect-arc furnaces; resistor furnaces; Nichrome type; rocking resistor furnaces; carbon trough or granular resistor furnaces; induction furnaces; low frequency furnaces; high frequency or coreless induction furnaces.

16-125. **Blast Furnaces.** T. L. Joseph. *Iron & Steel,* v. 18, Sept. '45, pp. 409-414.
Not a great deal of work has been done on the problem of dust loss in the blast furnace. Theoretical aspects of high top pressure and its influence on gas velocity with brief details of some practical tests.

16-126. **Tube Failures in Water-Tube Boilers.** *Combustion,* v. 17, Sept. '45, p. 44.
An unusual type of tube failure pertains to floor tubes in slag-bottom furnaces.

16-127. **Submerged Air-Gas Burner for Pickling Tanks.** A. M. Hoffmann. *Industrial Gas,* v. 24, Sept. '45, pp. 13-14.
Submerged combustion for heating pickling solutions operates on the same principle as the submarine cutting torch. It creates a pocket of air around the flame to prevent the water from dousing it.

16-128. **Hot-Air Aging Furnace at Consolidated Vultee Plant.** *Industrial Gas,* v. 24, Sept. '45, pp. 20-21, 34.
Gas-heated hot air furnace for accelerated age hardening of aluminum alloy aircraft parts. Oven dimensions listed; temperature kept within 2°; automatic control; weight of empty furnaces; control regulates heat of five sections.

16-129. **Working of a Multi-Tubular Gas-Fired Infra-Red Oven.** W. A. Fitzsimmons. *Industrial Gas,* v. 24, Sept. '45, pp. 22, 34.
Details of the performance of an infra-red oven used for experimental work on the drying of metal finishes.

16-130. **Malleablizing Iron Castings.** J. Fallon. *Foundry Trade Journal,* v. 77, Sept. 20, '45, pp. 53-56.
Development in technique which has found much favor in the U.S.A. Application of a sealed radiant tube heated bell-type furnace, for malleable iron castings. Furnace shows great flexibility in dealing with malleable castings of a wide range of compositions. Packing materials and annealing pans, which rapidly deteriorate and often exceed the weight of the effective load of castings, are eliminated. Bell-type radiant tube furnace provides facilities for effecting rapid air-quench, equalization and progressive slow cooling under absolute control.

16-131. **A New Departure in the Control of Furnace Dampers.** *Metallurgia,* v. 32, Aug. '45, pp. 179-180.
Fine adjustment of a heat treatment furnace damper plays an important part in the maintenance of controlled atmosphere conditions within the furnace chamber, but the damper control unit described is a new development.

16-132. **Acid Electric Furnace Carbon Control.** Charles Locke. *Iron Age,* v. 156, Oct. 18, '45, pp. 69-71, 176B.
Practical aspects of carbon control, the various types of equipment and procedures that can be used, and other factors leading to consistent quality heats.

16-133. **Explosions—Old and New.** C. Whitworth. *Machinery* (Lloyd), v. 17, Sept. 1, '45, pp. 47-52.
Explosions involving combustion; explosion of endothermic substances; use of atomic energy; some problems raised.

16-134. **Completely Automatic Control of Open Hearth Reversal.** B. M. Larsen and W. E. Shenk. *Canadian Metals & Metallurgical Industries,* v. 8, Sept. '45, pp. 42-43.
Reversal control designed so that, under operating conditions, no arbitrary limitation is imposed other than to keep the reversal interval within the optimum range.

16-135. **Melting Furnaces and Melting Practice.** L. W. Bolten. *Foundry,* v. 73, Oct. '45, pp. 100-103, 190, 193, 196, 199.
Trends in British melting practice. 6 ref.

17. REFRACTORIES AND FURNACE MATERIALS

17-54. **The Application of Infra-Red Radiation to the Drying of Refractories.** A. L. Roberts. *Refractories Journal,* v. 21, Aug. '45, pp. 301, 303, 305-313.
Outlines mechanism of radiant-heat transfer, and indicates the possibilities that this method offers for increasing both speed and efficiency of refractories drying.

17-55. **More News of Progress in the Development of Refractories.** L. Sanderson. *Refractories Journal,* v. 21, Aug. '45, pp. 316-319.
Fireclay and silica bricks; testing; presence of steam; insulating bricks; furnace wall patching; carbon and graphite; dolomite; syphon brick; permeability; stabilized dolomite clinker; X-ray inspection of stoppers.

17-56. **Properties and Care of Ladle Nozzles and Stoppers.** *Steel,* v. 117, Oct. 8, '45, pp. 126, 184.
Selection of nozzles and heads on the basis of modern technical knowledge, plus the development of proper techniques, will aid in meeting the strict pouring requirements imposed upon the manufacturer by the high quality standards of the steels produced today.

17-57. **Carbon Lining Prevents Formation of Salamander.** *Steel,* v. 117, Oct. 8, '45, p. 128.
Six stacks in this country employ carbon brick or paste in hearth construction. One carbon lining is on order and three are contemplated. Carbon mold plugs are in development stage; mold inserts are on trial. Runner lining promises new use for carbon.

17-58. **Refractories Performance Records.** Mervin A. Fay. *Iron & Steel Engineer,* v. 22, Sept. '45, pp. 101-107.
Records of performance are necessary to evaluate the various refractories. They aid in the design of furnaces and provide a guide for research in the development of improved refractories.

17-59. **Cleaning Open-Hearth Checkers by Vacuum.** A. F. Franz. *Iron & Steel Engineer,* v. 22, Sept. '45, pp. 108-111.
Application of steam jet vacuum systems in cleaning out open-hearth checker chambers and flues has shown marked economies.

17-60. **Developments in the Use of Lumnite Cement.** James E. Ludberg. *Steel,* v. 117, Oct. 22, '45, pp. 137-138, 140, 142.
Liberal portion of coarse firebrick aggregate beneficial to coke oven door linings. Clean used fiber brick from blast furnace stoves provides better aggregate than new brick. Thorough soaking of aggregate prior to mixing prevents a false quick set. Concrete lined coke oven doors installed on cold ovens give longest service life.

18. HEAT TREATMENT

18-229. **Whiteheart Malleable.** A. G. Robiette. *Iron & Steel,* v. 18, Sept. '45, pp. 421-424.
New gaseous process for annealing. Properties required; after-treatment of whiteheart malleable iron; effects of alloys and composition; austenitic malleable irons; plant and operating conditions; economies of the gaseous process.

18-230. **Alloy Steel Bars.** *Iron & Steel,* v. 18, Sept. '45, pp. 439-440.
Electric furnaces for hardening and tempering.

18-231. **Refrigerating Aluminum to Arrest Age Hardening.** M. L. Rask. *Modern Metals,* v. 1, Oct. '45, pp. 19-21.
Outline of arresting age hardening of heat treatable aluminum alloys deals with a refrigerated method. Purpose of refrigerating is to keep the aluminum in a soft and workable condition prior to forming. Advantage is in preventing high strength alloys like 75S from aging, if there is to be an interval between heat treating and final forming. 4 ref.

18-232. **Research Finds the Answer.** William M. Sutherland. *Modern Machine Shop,* v. 18, Oct. '45, pp. 184, 186, 188, 190, 192.
New heat treat chemicals discovered to replace critical materials.

18-233. **Continuous Heat Treatment of Bars by High Frequency Induction.** *Machinery* (London), v. 67, Sept. 13, '45, pp. 281-284.
Continuous heat treatment is applied to bars normally supplied in the hardened and tempered condition. Bar is fed continuously through an inductor coil, and is heated by the high frequency eddy currents induced in it by the current in the coil. The rate of increase in temperature while the bar is magnetic is more rapid than after the Curie point is passed. Final temperature adjustment is effected by carefully controlling the speed of travel of the work and the power input.

18-234. **Molten Baths for the Wire Industry, Part I.** F. R. Morral. *Wire & Wire Products,* v. 20, Oct. '45, pp. 736-737, 740-741.
Review of the various uses of salt baths in the wire industry for cleaning, heat treating, and others. History of fused salts as applied to the wire industry is summarized from the patent and technical literature. Properties and new work. 57 ref.

18-235. **Annealing High Carbon Wire Stock.** J. H. Loux. *Wire & Wire Products,* v. 20, Oct. '45, pp. 742-745, 748-749.
Importance of correct atmosphere in the prevention of decarburization, with particular reference to moisture content. Recarburization is possible with close control, but its practicality is still a moot point.

18-236. **Solution Heat Treatment.** *Metal Industry,* v. 67, Sept. 21, '45, p. 184.
Indirectly heated electric furnace for aluminum alloys. (From *Industrial Heating.*)

18-237. **Induction Heating and Heat Treating.** Harry B. Osborn, Jr. *Metal Progress,* v. 48, Oct. '45, pp. 801-806.
Historical background; influence of magnetism on high frequency heating; dielectric heating; relations between frequency, diameter and penetration; non-cylindrical parts; internal hardening; power sources. Formulae for resistance heating; formulae for induction heating.

18. HEAT TREATMENT (*Cont.*)

18-238. Important Achievements of Induction Heating. *Metal Progress*, v. 48, Oct. '45, pp. 806-814, 832.
Frequencies up to 10,000 cycles, by Harry B. Osborn, Jr.; Frequencies from 100,000 to 500,000, by Jules J. Fox; Vacuum tube units, by J. Wesley Cable.

18-239. In Wartime—Salt Baths—In Peacetime. W. W. Winters. *Metal Progress*, v. 48, Oct. '45, pp. 815-817.
Improvement in furnace design has been the utilization of suitable refractory pots for many heat treatments previously carried out in metallic alloy pots. Ceramic containers have directly lengthened pot life in high speed steel tool hardening installations.

18-240. Heat Treating Diagrams—S or TTT-Curves. F. R. Morral. *Metal Progress*, v. 48, Oct. '45, pp. 818-832.
Use of S or TTT-curves for steel gives a fairly accurate prediction for designing a heat treatment to meet any normal requirements. Treatments which can be established if a curve of the steel or of a similar analysis is available are spheroidizing, normalizing, annealing, hardening, martempering and austempering. Isothermal transformation curves for some 190 analyses are available and indexed. Typical curves and tables of thermal data are shown by means of which the metallurgist or heat treater, to whom the references were not available, could draw his own diagram with reasonable accuracy.

18-241. Maximum Carbon in Carburized Cases. Sidney Breitbart. *Iron Age*, v. 156, Oct. 11, '45, pp. 50-52.
Practical aspects of the author's nucleation theory that the excessive or normal carbon content of a carburized surface depends on the presence of free carbides in the steel during carburization. Effects of carburizing medium, carburizing potential, temperature and steel chemistry described and a method of control of the carburizing process in order to eliminate carburized cases containing excessive carbon contents.

18-242. Spheroidizing Treatment. Eric N. Simons. *Machinery* (London), v. 67, Aug. 23, '45, pp. 210-213.
Three conditions of steel; nature of spheroidizing; breaking down the pearlite; effect of fine grain; spheroidizing ball bearing steel; spheroidizing steel for cold pressings.

18-243. Effect of Various Surface and Structural Conditions on Nitriding. F. F. Dodson. *Metallurgia*, v. 32, Aug. '45, pp. 149-151.
With the object of reducing the time factor, generally associated with the nitriding process, experiments have been carried out in an effort to relax preliminary precautions usually considered to be necessary to produce the desired case and obtain the physical properties sought in the core. Effects of various surface and structural conditions on the results obtained after nitriding DTD.87A and DTD.306 material, including different methods of operating the process.

18-244. The Water Quenching of Steel Castings. *Metallurgia*, v. 32, Aug. '45, pp. 175-177.
Developments in the water quenching of steel castings; problems in the quenching of miscellaneous sized castings; design and mass in water quenching; the water quenching of small and of large castings; and facilities for water quenching steel castings.

18-245. Uncommon Applications of High Frequency Heating. E. D. Tillson. *Iron Age*, v. 156, Oct. 4, '45, pp. 72-73, 158, 160.
Believing that induction heating was not sufficiently known or used outside the regular metal working industries, Commonwealth Edison Co. set up a testing laboratory. Interesting and unusual applications devised are described.

18-246. New Heat Treat Neutralizing Chemical. William M. Sutherland. *Iron Age*, v. 156, Oct. 4, '45, p. 82.
Sodium acid sulphate gives successful results and saves approximately 75% in cost of materials.

18-247. Spheroidizing Treatment. Eric N. Simons. *Machinery* (London), v. 67, Aug. 30, '45, pp. 235-237.
Transformation treatment; importance of temperature; types of furnaces; preheating low carbon steels; spheroidizing alloy steels; transformation time; decarburization; graphitization.

18-248. Effective Use of Dissociated Ammonia. C. V. Snell. *Metals & Alloys*, v. 22, Sept. '45, pp. 727-730.
Economies and advantages of, and equipment and practice for using ammonia effectively in metal processing. 8 ref.

18-249. Gas Carburizing. Ernest S. Kopecki. *Iron Age*, v. 156, Oct. 18, '45, pp. 50-53.
General summary of carburization and decarburization and discussion of the choice of steel for best results and the effect of grain size.

18-250. Conveyorized Non-Decarburizing Heat Treatment of Gears. W. J. Bornholdt and H. E. Scarbrough. *Iron Age*, v. 156, Oct. 18, '45, pp. 54-57.
By the continuous method of heat treatment described, data are furnished on how average costs have been cut in half against those of other methods. Cleaning and tin plating to overcome scaling have been eliminated.

18-251. Chromium, Silicon and Aluminum Impregnation of Steel. *Iron Age*, v. 156, Oct. 18, '45, pp. 58-61.
Methods and procedures for impregnating steel with chromium, silicon and aluminum. *(Stal.)*

18-252. Induction Heating of Small Parts. Seward A. Covert. *Iron Age*, v. 156, Sept. 27, '45, pp. 60-63.
Because high frequency current has only shallow penetration, induction heating is particularly well suited for the heating of small parts. Various applications of high frequency hardening and annealing described.

18-253. Modern Heat Treating Practice. Arnold P. Seasholtz. *Steel*, v. 117, Oct. 1, '45, pp. 126, 129-130.
Recommended procedure for heat treating high speed steel.

18-254. Controlled Heat Treating. Leon N. Olberg. *Western Machinery & Steel World*, v. 36, Sept. '45, pp. 400-401.
Use of standard end-quench hardenability test.

18-255. Direct Resistance Heating of Salt Baths for the Patenting of Steel Wire. W. Heidenhain. *Stahl & Eisen*, v. 64, 1944, pp. 747-428. *Engineers' Digest* (American Edition), v. 2, Sept. '45, pp. 427-428.
Development of a method in which the molten salt contents of the pot act as the resistor. Heating process is initiated by creating a liquid bridge between the electrodes by means of a special electric heating ribbon extending between the electrodes. This ribbon is removed from the bath after the flow of current between the electrodes has been established. Diagrammatic view of the bath installation is given.

19. WORKING

Rolling, Drawing, Pressing, Forging

19-278. The Extrusion of 8-Inch Diameter Brass Tubing. *Machinery* (London), v. 67, Sept. 6, '45, pp. 253-256.
Technique employed in using a 4000-ton hydraulic press.

19-279. Short-Run Press Tools. P. Wise. *Machinery* (London), v. 67, Sept. 6, '45, pp. 268-270.
Die sections; strippers; bottom bolsters and punches; die construction; die assembly; piercing tools; die sets.

19-280. Hot Working Characteristics. C. L. Clark and J. Russ. *Iron & Steel*, v. 18, Sept. '45, pp. 441-442.
Evaluation by means of hot twist tests. Interpretation of the results, the application of these, and some of the limitations of the method involved.

19-281. Stainless Steel and Its Fabrication. Paul F. Voight. *Sheet Metal Worker*, v. 36, Sept. '45, pp. 58-60.
Soldering; cutting operations; punching and shearing; riveting; drawing and forming; spinning; passivation.

19-282. Forging Die Design. John Mueller. *Steel Processing*, v. 31, Sept. '45, pp. 560-562.
Die designer must consider certain forging rules. Forging prints must be carefully studied on questions of specifications and practicability for forging. Forging techniques must be established, and on completion of the dies the metal flow of sectional reductions must be confirmed by acid etch tests prior to actual production.

19-283. Hot Press Forming of Heavy Steel Plates. *Steel Processing*, v. 31, Sept. '45, pp. 574-576.
By hot working of metal at temperatures above those of recrystallization, mass production of stampings is possible. Steel with thicknesses ranging up to 3½ in. or more can be hot pressed into difficult shapes. Case histories illustrate interesting problems solved by hot pressings.

19-284. Induction Heating Develops Widespread Application in the Forging Industry. Seward A. Covert. *Steel Processing*, v. 31, Sept. '45, pp. 577-581.
Advantages; induction phenomenon; modern forge furnace; cost of equipment; case histories; forging propeller hubs.

19-285. Postwar Application of Shot Peening. A. E. Lenhard. *Modern Industrial Press*, v. 7, Sept. '45, pp. 20, 22, 40.
End result of a wider application of peening for postwar use will be: To lengthen the life of products and parts that previously had failed in service; to permit higher stresses in parts, thereby increasing efficiency with no increase in weight; to reduce the size and cost of parts by increase in fatigue resistance; to cut production costs by eliminating operations such as grinding and polishing; to use the same size parts, but made of less expensive metals and alloys.

19-286. Deep Drawing Principles, Part II. William Schroeder and William A. Box. *Modern Industrial Press*, v. 7, Sept. '45, pp. 24, 26, 28.
Principle of similarity as applied to deep drawn parts of simple outline; rectangular parts and shapes with irregular bases; blank development; principle of constancy of area; parts with flanges; relation of h/d to per cent reduction of diameter; multiple operation parts. 12 ref.

19-287. Equipment Employed in Straightening Operations. John E. Hyler. *Steel*, v. 117, Oct. 8, '45, pp. 110-111, 172, 174, 176.
Pipe, tubing, steel plate, wire, small rods and ordnance components straightened with aid of machines and fixtures of many types. Portable hydraulic unit widely used in maintenance. Coiled tubing straightened, measured and cut automatically. Pneumatic presses effective. Roller leveler handles ¾-in. plate. 22 ref.

19-288. Stamping and Deep Drawing Magnesium. J. Walter Gulliksen. *Product Engineering*, v. 16, Oct. '45, pp. 687-691.
Techniques and design criteria for deep drawn and stamped parts of magnesium. Data on punching, blanking, bending, forming and drawing operations included, and case histories presented.

19-289. Twin-Motor Drives in Hot Reducing Mills. Frank W. Cramer. *Iron Age*, v. 156, Oct. 11, '45, pp. 58-61.
Carnegie-Illinois Steel Corp. has been using twin-motor driven rolls in blooming, slabbing, and reversing plate mills with considerable success and is considering today the installation of such equipment on cold reducing mills. Description of the development of these mills.

19-290. Hinged Form Dies. *Aircraft Production*, v. 7, Sept. '45, p. 424.
Improved type of tool for use on rubber press.

19-291. Electric Equipments for a 16-Stand Tube Mill. A. L. Thurman. *Blast Furnace & Steel Plant*, v. 33, Oct. '45, pp. 1235-1241, 1247.
Mill; application problem; electric equipment; mill operation; special tests.

19-292. Manufacture of Fine Steel Wire and Some of its War Applications. J. R. Thompson. *Blast Furnace & Steel Plant*, v. 33, Oct. '45, pp. 1248-1252, 1276-1277.
Role of fine steel wire as a war material. Manufacture of fine wire.

19-293. Mechanite—an "All-Around" Die Material. J. C. Beattie. *Tool Engineer*, v. 15, Oct. '45, pp. 34-37.
Engineered metal provides unusually wide application in die manufacture.

19-294. Production Processes—Their Influence on Design. Roger W. Bolz. *Machine Design*, v. 17, Oct. '45, pp. 147-152.
Die forging.

19-295. Modernizes Barmaking Facilities. *Steel*, v. 117, Oct. 1, '45, pp. 110-111, 145-146.
New 18-stand 10-in. bar mill now being installed at Bethlehem's Lackawanna division will have a delivery speed of 2400 fpm. and a monthly capacity of 22,000 tons. Vertical rolls prevent twisting of stock between passes. Cooling bed arranged for space formation cooling or pack annealing. Mill assures increased operating efficiency and improved quality of alloy and carbon steel bars.

19-296. Design of Magnesium Forgings. A. L. Rustay and F. B. Rote. *Product Engineering*, v. 16, Oct. '45, pp. 682-686.
Design and qualities of magnesium alloy forgings as affected by a new production method using both press and hammer, which makes it possible to produce more forgings from existing equipment.

19-297. Hydraulic Stretch-Forming of Metal Parts. Harry P. Smith. *Western Machinery & Steel World*, v. 36, Sept. '45, pp. 405-407.
In the operating cycle, loading and unloading of the work is accomplished without need for the operator to move away from the control panel at the front of the machine. This feature greatly reduces cycle time and increases the number of work pieces processed per hour.

A.S.M. Review of Current Metal Literature — *Continued*

19-298. Deep Drawing Dies of Cemented Carbide. W. J. Bratton. *Western Machinery & Steel World,* v. 36, Sept. '45, pp. 410-411.

Deep drawing dies of Carboloy cemented carbide are giving good results in the production of sheet metal shields for radio tubes. Some of the carbide dies have turned out over 1,000,000 pieces each. This represents 500% more drawing operations than was "expected" when the carbide dies were installed in the place of the conventional hardened steel dies formerly used.

19-299. Cold Roll Forming of Various Sheet and Strip Metal Sections. C. M. Yoder. *Sheet Metal Industries,* v. 22, Sept. '45, pp. 1578-1585.

Trend of manufacture using steel as produced by continuous mills, and cold forming it into structural sections; and to indicate what a tremendous saving is effected in conversion costs over the well-known hot rolled shapes. Cold roll forming will not completely replace hot rolling but the cold roll forming method will play an increasingly important part in post-war activities. (From *Iron and Steel Engineer.*)

19-300. Sendzimir Mill Employs Caster Backing Principle. *Steel,* v. 117, Oct. 22, '45, pp. 124, 126.

Precision cold strip mill embodying new principles for reduction of steel, aluminum and copper. Work rolls 2½ in. diameter are employed for rolling strip 50 in. wide. No backup rolls are involved. Mill is compensated for deflection. Strip free from camber. Ten mills of this type soon to be operating in this country. Lubricating system maintains rolls at uniform temperature.

19-301. Manufacture of Fine Steel Wire and Some of Its War Applications. J. R. Thompson. American Iron and Steel Institute Yearbook, Advance Copy, 1945, 19 pp.

Manufacture of wire ranging from $\frac{1}{4}$ in. down to 0.005 in. diameter for springs in time-fuse mechanisms, insect screening, mine-trip wire, filter screens, and all types of communications and recording devices.

19-302. The Witter Process for the Manufacture of Shell Forgings and the Spinning Process for the Manufacture of Bombs. J. L. Johnson. American Iron and Steel Institute Yearbook, Advance Copy, 1945, 22 pp.

Witter process starts with heated steel slug shaped like a thick tube closed at one end. Three rolls "cross-roll" or knead the heated metal to reduce the wall thickness and lengthen the slug. The resulting cup is pushed through a sizing die to give it the desired dimensions before it is machined to the finished dimensions. In the spinning process one end of a seamless tube is placed in a furnace until it is hot enough for forging. The tube is then placed in a machine which spins it at a high rate of speed. A shaping wheel or tool, rotated by frictional contact with the spinning tube, forms the desired contours.

19-303. Cold Finished Bars to Physical Property Specifications. Maurice N. Landis. *Metal Progress,* v. 48, Oct. '45, pp. 769-777.

Cold drawn bars should be used more discriminatingly to take advantage of inherent and acquired advantages over hot rolled bars. Gives exhaustive statement of mechanical properties of C1137 (X1335) after various commercial cold drawing and furnacing programs in sizes ½ to 2$\frac{1}{16}$ in.; minimum specification requirements for C1000 and C1100 series after various manufacturing routines.

20. MACHINING AND MACHINE TOOLS

20-425. Broaching—Important to Postwar Production. *Western Metals,* v. 3, Sept. '45, pp. 18-20.

The principle of broaching; history of broaching; phenomenal operation; use of broaching in postwar production.

20-426. Tool-Room Precision on a Mass Production Basis. Charles O. Herb. *Machinery,* v. 52, Oct. '45, pp. 139-148.

Tolerances in tenths and split tenths are regular specifications in a New England shop that produces precision gears and high-grade special-purpose pumps.

20-427. Initial Contact of Milling Cutter and Work-Piece. M. Kronenberg. *Machinery,* v. 52, Oct. '45, pp. 149-156.

Importance of the initial contact between the teeth of a milling cutter and the work being milled has been largely overlooked in the past. Comprehensive study of this subject, calling attention to many factors that have seldom been taken into consideration.

20-428. Rearrangement of Four-Spindle Drill Presses Increases Production. *Machinery,* v. 52, Oct. '45, p. 157.

By changing the position of two idle spindle units of straight-line four-spindle drill presses so that two pairs of spindles are located back to back, and building auxiliary tables, a second production line was established from the previously unused spindles without interfering with original production line.

20-429. Machine Grouping Eliminated Center-Wing Bottlenecks. *Machinery,* v. 52, Oct. '45, pp. 162-165.

Eight machine tools set up as one unit for drilling, reaming, boring, and facing operations on airplane center wings constituted one of the outstanding manufacturing features at the Willow Run Bomber Plant.

20-430. Milling Cutter Saves Ten Thousand Man-Hours a Year. *Machinery,* v. 52, Oct. '45, pp. 166-167.

Designed especially for a particularly difficult milling operation on aircraft landing-gear struts, a new cutter has resulted in time and material savings, as well as in a better product.

20-431. Ingenious Applications of Steel Balls in Machine Design. *Machinery,* v. 52, Oct. '45, pp. 168-170.

Ball bearings can be used advantageously by engineers and designers in devices developed for a wide variety of purposes. Illustrations presented.

20-432. Battery of Thirty-Two Automatics With Chip and Product Conveyor. *Machinery,* v. 52, Oct. '45, pp. 171-172.

Machines mounted on a long bench, with a spacing of 24 in. between spindle centers. All machines can be set up to handle the same piece, or any desired number can be set up individually for different pieces and kept in continuous production with a minimum of attention.

20-433. Ingenious Mechanical Movements. *Machinery,* v. 52, Oct. '45, pp. 185-186.

Automatic magazine-feed attachment for centerless grinder.

20-434. Friction Cutting of Metals by Band Saws. H. J. Chamberland. *Machinery,* v. 52, Oct. '45, p. 188.

Production rates range from 24 to 60 linear in. on material ¼ in. thick, to from 6 to 20 linear in. on material ½ in. thick. Material as thick as ¾ in. has been cut successfully, but when the material is thicker than that, certain difficulties have been met, which, it is hoped, will be overcome through research and experiments. Table gives band-saw velocity, in feet per minute, recommended for different types of steel and cast iron.

20-435. Fixture for Grinding a Helical Gage. L. K. *Machinery* (London), v. 67, Sept. 13, '45, pp. 297-298.

Consists of a work-holding part supported on a carriage which is given a longitudinal movement, and means for imparting a partial revolution to the work during the longitudinal movement.

20-436. A Rocket Production Line. W. G. Miller. *Machine Tool Blue Book,* v. 41, Oct. '45, pp. 141-144, 146, 148, 150, 152.

New projectile line makes use of the best in materials handling and metal working techniques.

20-437. The Art of Metal Cutting, Part X. *Machine Tool Blue Book,* v. 41, Oct. '45, pp. 159-160, 162, 164, 166, 168.

Simple face milling.

20-438. Versatility of the Ball, Part III. H. F. Williams. *Machine Tool Blue Book,* v. 41, Oct. '45, pp. 175-176, 178, 180, 182, 184, 186, 188.

Modern machinery applications.

20-439. Reconditioning Milling Cutters. *Machine Tool Blue Book,* v. 41, Oct. '45, pp. 199-200, 202, 204.

Properly grinding and generally reconditioning milling cutters.

20-440. Recommended Methods for Grinding Grooving or Slotting Tools. Charles L. Hall. *Production Engineering & Management,* v. 16, Oct. '45, pp. 75-76.

Procedures for grinding, grooving or slotting tools by the tip-up method with a square face wheel and also grinding these tools with a dressed angle wheel.

20-441. Labor Saving Tooling Developed by Navy. *Production Engineering & Management,* v. 16, Oct. '45, pp. 90-91.

Rotary fixture cuts time on milling operation; robot hopper feeds screw machine automatically; dual disks provide simple deburring machine; checking attachment cuts time on hobbing hobs.

20-442. High Production With Inexpensive Equipment. *Production Engineering & Management,* v. 16, Oct. '45, p. 92.

Arrangement of standard tools and scrap material made possible the rapid processing of parts and voided the delay that the purchase of special equipment would have caused.

20-443. Complicated Parts Produced by Broaching. Harry H. Gotberg. *Production Engineering & Management,* v. 16, Oct. '45, pp. 94, 96.

Indicating wide versatility, broaching is being used for rough and finish machining of complicated parts. Pull-down broach machines are equipped with indexing and shuttling table and interchangeable broaches designed for low-cost maintenance.

20-444. Milling Cast Iron With Carbides. Michael Field and W. E. Bullock. *Mechanical Engineering,* v. 67, Oct. '45, pp. 647-658.

Equipment used in investigation; testing procedure; scope of investigation covered in paper; discussion of results; cost of milling. 9 ref.

20-445. Carbide Milling of Steel. A. W. Meyer and F. R. Archibald. *Mechanical Engineering,* v. 67, Oct. '45, pp. 659-667.

Steels selected for test specimens; types and sizes of cutters; condition of tools after tests; soft steels; use of coolants; hard steels; multiple-tooth cutters; finish obtained.

20-446. Cadillac War-Job Tooling. Bartlett West. *Modern Machine Shop,* v. 18, Oct. '45, pp. 124-128, 130, 132, 134.

Tools developed by an automobile manufacturer to speed the war effort.

20-447. Designing and Using Milling Cutters and Fixtures, I. C. W. Hinman. *Modern Machine Shop,* v. 18, Oct. '45, pp. 138, 140, 142, 144, 146, 148, 150, 152.

Milling methods and their relation to cutter design.

20-448. The Army's Modern Machine Ship. *Modern Machine Shop,* v. 18, Oct. '45, pp. 198, 200, 202, 204, 206, 208.

Ordnance Department has put a barge under a full-fledged machine shop and sent it out to sea. Made up of experienced machinists, welders, toolmakers, heat treaters, and other mechanics and artisans, the equipment includes lathes, milling machines, shapers, drill presses, grinders, heat treating equipment—anything necessary for maintenance of fighting equipment.

20-449. Ideas From Readers. *Modern Machine Shop,* v. 18, Oct. '45, pp. 214, 216, 221-222, 224, 226, 228, 230.

Drill holder controls depth of holes. Fixture for checking tapers. Gear assembling fixture. Countersinking jig for aircraft work. Emergency inside micrometer for large work.

20-450. Improved Tooling. G. Eldridge Stedman. *Steel,* v. 117, Oct. 8, '45, pp. 112-116, 118, 178.

Aids Southern plant in stepping up output per worker from $2985 to $6179 per year.

20-451. The Cutting Tools of World War II. Malcolm F. Judkins. *Metal Progress,* v. 48, Oct. '45, pp. 901-904.

Outstanding things which were learned about metal cutting and metal cutting materials. Cutting efficiency of high speed and other toolsteels was sacrificed if tungsten and vanadium were limited in content. Conservation program was necessitated by the demands of the armed forces. Cutting of hard, tough, and heat treated materials was thoroughly feasible with carbide tipped tools. Metal could be removed at the highest rate by carbide tools. Possible to machine parts for closely fitting mechanisms to much narrower tolerances than were hitherto thought possible.

20-452. Two-Spindle Milling Head Simplifies Grooving of Turbine Parts. Ernest Miekley. *American Machinist,* v. 89, Oct. 11, '45, pp. 110-112.

Stainless steel workpieces are held in an air-operated fixture developed by Hendy engineers to increase production of the parts.

20-453. The Disposal of Surplus Tools, I—The Problem. Benjamin W. Corrado. *American Machinist,* v. 89, Oct. 11, '45, pp. 123-126.

Disposal of government surplus tools will not be easy for RFC officials charged with this responsibility. Priorities difficult; employment a factor; ten years' output; surplus ratio.

20-454. The Disposal of Surplus Tools, II—Moving Toward the Solution. *American Machinist,* v. 89, Oct. 11, '45, pp. 126-130.

Prospects posted; sales F.O.B.; disposal sites.

20-455. Practical Ideas. *American Machinist,* v. 89, Oct. 11, '45, pp. 131-136.

Machine vise for bandsaw cutting thin-walled alloy steel tubes. Loose thread mandrel holds tubular work on center. Long-radius milling attachment machines accurate curves. Accurate machine tapping replaces hand tapping. Spray gun mask shields welded joints from paint. Long small-diameter pulley fastened securely to shaft. Portable grinder converts lathe to surface grinding. Indexing fixture for use in regrinding punches. Eight-station indexing head for automatic milling operations. Balancing heavy pipe to facilitate handling on the welding bench. Lapping small holes quickly with interlocked cotter pins. Indicator gage checks limits of inside dimensions rapidly.

20-456. Storage of Surplus Government Machines. *American Machinist,* v. 89, Oct. 11, '45, p. 139.

Importance of proper preparation; special preparation required for open storage; skids used for protection; contracting for preparation; inspection prior to shipment.

20-457. Rubber Tooling in Naval Gun Production. A. W. *Machinery* (London), v. 67, Aug. 23, '45, pp. 197-204.

In many of the special tools employed, rubber is used either for guiding purposes or for expanding abrasive stones radially in the honing on internal surfaces. Rubber is used instead of hard wood for packing the bit tools employed in boring the guns.

20-458. Spherical Turning Head Attachment for Boring Mill. A. F. F. *Machinery* (London), v. 67, Aug. 23, '45, pp. 207-208.

Spherical bearing seat machined in the shell and held to a tolerance of ±0.001 in. A horizontal floor-type boring machine is used as the power unit for driving the attachment. The attachment can also be used on a vertical boring mill or, with suitable holders, on a lathe or a drill press.

20-459. Diamond Hones. F. Whitehead. *Aircraft Production,* v. 7, Sept. '45, pp. 442-443.

Important development for finishing simultaneously the interior and exterior of Hercules cylinder sleeves.

20. MACHINING (*Cont.*)

20-460. **Machining Practice for Magnesium Castings.** H. E. Linsley. *Aluminum and Magnesium*, v. 1, Sept. '45, pp. 12-14, 21.

Certain points of difference occasioned by the nature of the metal itself which require the application of specific techniques. Easy machinability and consequent low power consumption offer an unusual opportunity for the use of multiple-spindle, multiple-operation machine tools, with a resultant reduction in manufacturing costs. Focuses attention on some of the major difficulties to be encountered, and suggests ways in which these may be overcome.

20-461. **Surface Broaching in an Aircraft Factory.** *Machinery* (London), v. 67, Aug. 30, '45, pp. 225-231.

Method for joining together the various spar-boom members of Vickers aircraft. The ends of the booms, which are made from tubular extrusions in light alloy, are specially serrated to suit complementary serrations in joint plates, and the booms and plates are bolted together.

20-462. **Indexing Blocks Simplify Grinding Operations.** *Machinery* (London), v. 67, Aug. 30, '45, pp. 233-234.

Surface grinders equipped with a magnetic table chuck can be used advantageously for grinding square, hexagonal, and other shapes by the use of simple indexing blocks. These comparatively simple blocks make it possible to handle work that would otherwise require the use of an expensive indexing head.

20-463. **Special Duplex Saw Squares Extrusion Ends Accurately.** *American Machinist*, v. 89, Sept. 27, '45, pp. 110-112.

Pneumatic stamping units used for adequate support at the cut. The saw heads swivel to required angles and safety devices protect the operator.

20-464. **Drill Press "Merry-Go-Round" Coordinates Operations on Fuze Parts.** *American Machinist*, v. 89, Sept. 27, '45, pp. 124-125.

Two drill presses set-up back-to-back for assembling, drilling and riveting of two parts in an efficient style.

20-465. **Practical Ideas.** *American Machinist*, v. 89, Sept. 27, '45, pp. 131-136.

Direct-reading protractor for correction of static unbalance. Changing order of operations boosts production 30%. Both hands control work when foot switch is used. Single plane adjustable drill jig accurately locates angular holes. Index plate on lathe chuck for accurate angular laying-out. Toolbit grinding fixture for front and side rake. Close tolerance and concentricity held by expanding boring fixtures. Fork lift operator lifts flat boxes without help. Universal gaging fixture for shouldered machine parts. Back-stop permits facing thin metal in a lathe chuck. Trap-door basket discharges heat treated parts quickly. Ball-bearing rollers speed laying-out and burning.

20-466. **Milling Heavy Sections of 14S-T Aluminum Alloy.** *Iron Age*, v. 156, Oct. 18, '45, pp. 62-63.

Good results cannot be obtained unless the cutters are kept sharp. Carefully balanced flywheels attached to the spindles were found to be important in reducing vibration and producing smooth operation of the machine. Successful results were obtained only with positive rakes. Heavy burrs left at the edges and ends of each surface necessitated a deburring operation. Tool and cutter design varies for each application.

20-467. **Multiple Borizing Setups.** C. G. Nordmark. *Steel*, v. 117, Oct. 1, '45, pp. 106-109, 142.

Ingenuity in working out a simple way to handle complicated jobs. Production quadrupled over former methods in certain instances. Holes bored simultaneously; support incorporated in fixture.

20-468. **Self-Actuating Machine Tools Command Increasing Attention.** Guy Hubbard. *Steel*, v. 117, Oct. 1, '45, pp. 116-117.

Trends toward shorter hours and higher pay accentuate interest in labor-aiding machinery as major factor in preventing costs of manufactured products from rising sharply.

20-469. **Trends in Metal Cutting Are Clearly Indicated by Cincinnati ASME Sessions.** Guy Hubbard. *Steel*, v. 117, Oct. 15, '45, pp. 121, 184.

Refinements in cutting tools inspire redesign of machine tools which in turn inspire revision of thinking among engineers.

20-470. **Special High Production Units are Featured in Cylinder Machining Line.** G. W. Birdsall. *Steel*, v. 117, Oct. 22, '45, pp. 108-110.

Operations in the machining line set up for finishing the castings that constitute the main frame and cylinder of 4-cycle single-cylinder air-cooled gasoline power plants.

21. LUBRICATION AND FRICTION; BEARINGS

21-76. **Lubrication in the Drawing of Metals.** Samuel Spring. *Steel*, v. 117, Oct. 8, '45, pp. 120, 122, 125, 180, 182.

Physical methods of testing drawing lubricants. Boundary and extreme pressure lubricants; methods of testing boundary lubricants; measuring extreme pressure lubrication characteristics; methods of testing extreme pressure lubricants. 39 ref.

21-77. **Assembly of Bearings by Sampling Principle.** *Iron Age*, v. 156, Oct. 11, '45, p. 53.

New method consists of the operation of taking one inner ring from a group of about ten such rings previously selected by measurement, and matching its fit with an outer ring belonging to a selected group of outers in the same dimensional range variation as the inners.

21-78. **The Function of Grinding Fluids.** W. H. O. *Machinery* (London), v. 67, Aug. 23, '45, p. 219.

Brief review of grinding fluids; chip formation in grinding.

21-79. **Improved Babbitting Methods.** George R. Park. *Iron & Steel Engineer*, v. 22, Sept. '45, pp. 48-49.

Using a novel combination of equipment, modern production methods have been applied to babbitting, resulting in greater safety and economy.

21-80. **Cutting Fluid Applications.** Albert W. McCalmont. *Tool Engineer*, v. 15, Oct. '45, pp. 26-27.

Right cutting fluid, properly applied, prolongs tool life and improves surface quality.

21-81. **Simplified Lubrication.** James G. O'Neill. *Steel*, v. 117, Oct. 1, '45, pp. 118, 124.

Charts for lubrication of steel mill and metal-working equipment are designed to reduce inventories of lubricants and check errors in applications.

21-82. **Storage and Handling of Lubricants.** L. E. Lovitt. *Iron & Steel Engineer*, v. 22, Sept. '45, pp. 52-53, 56.

Adequate storage and distribution of lubricants is essential to a well developed lubrication program. Cleanliness is essential.

21-83. **Organization of a Lubrication Department.** C. A. Bailey. *Iron & Steel Engineer*, v. 22, Sept. '45, pp. 54-56.

Results from a lubrication department are directly proportional to effort expended. Close cooperation between maintenance and lubrication departments is essential.

21-84. **Shaft Currents May Cause Bearing Failure.** D. B. Hoover. *Iron & Steel Engineer*, v. 22, Sept. '45, pp. 72-74, 78.

Excessive bearing wear and failures may result from stray currents induced in the shaft of an a. c. or d. c. machine. Such currents are easily eliminated or shunted away from the bearings.

21-85. **Lubrication in the Drawing of Metals.** Samuel Spring. *Steel*, v. 117, Oct. 15, '45, pp. 124, 126, 128, 130, 133, 134, 180.

Specific methods of testing drawing lubricants. 9 ref.

22. JOINING

Welding; Brazing; Flame Cutting; Riveting

22-519. **Power for Welding.** L. W. Clark. *Welding Journal*, v. 24, Sept. '45, pp. 811-817.

Discussion of power supply for resistance welders. Lamp flicker; early welder trouble; welder operation; utility system; stepdown transformer banks; low-voltage bus and feeders; good and poor installations; welding machines and their operation.

22-520. **A Machine for Production Flame Cutting of Small Shapes.** E. E. Hart. *Welding Journal*, v. 24, Sept. '45, pp. 819-823.

Eight-torch flame-cutting machine in which all operations, after the multi-component bars are placed on the machine, are mechanically carried out. Discussion limited to shapes up to 3x7x24 in.

22-521. **Arc Welding Engineering Problems and Engineers.** Walter J. Brooking. *Welding Journal*, v. 24, Sept. '45, pp. 825-832.

Evaluating and selecting welding processes, machines and equipment; evaluating and selecting welding electrodes; evaluating and testing welding operators; adapting welding operators by training; correlating design with practical shop practice and equipment; create fixtures for setting up and positioning for welding; establish procedures for welding the company's products; organize detail welding control; establish quality control (inspection); keeping abreast of practice within the industry; who then is a welding engineer.

22-522. **Resistance Welding Laboratories and Their Instruments.** R. T. Gillette. *Welding Journal*, v. 24, Sept. '45, pp. 833-837.

Briefly outlines functions of welding, laboratory and equipment.

22-523. **Machine Gas Cutting.** R. M. Dennis. *Welding Journal*, v. 24, Sept. '45, pp. 839-842.

Discussion of some of the innovations and accessories that have been devised and developed for use in the flame cutting department of By-Products Steel Corp.

22-524. **Metallurgical Factors of Underbead Cracking.** S. L. Hoyt, C. E. Sims and H. M. Banta. *Welding Journal*, v. 24, Sept. '45, pp. 433s-445s.

Relative underbead cracking tendencies of hardenable steels, such as S.A.E. 4130, may be determined by a simple weld test made under carefully controlled conditions. Extent of underbead cracking, crack sensitivity, can be correlated with the dilatometric characteristics obtained in a rapid thermal cycle. Restraint and thermal stresses in a weld are not primary causes of underbead cracks but are responsible for their propagation. 4 ref.

22-525. **Production Technique and Quality of Flash Welded Joints.** Hans Kilger. *Welding Journal*, v. 24, Sept. '45, pp. 459s-480s.

Tensile strength and hardness; defective welds.

22-526. **The Welded Tank.** *Welding*, v. 13, Sept. '45, pp. 336-343.

British armored fighting vehicles are now welded. Case for the welded tank; investigational work; welding of heavy armor; battleworthiness and joint design; jigs and manipulators.

22-527. **Hot Riveting.** R. Bushell. *Welding*, v. 13, Sept. '45, pp. 344-347.

Electrical upsetting process.

22-528. **Flash-Butt Weld Quality.** W. Forbes Young. *Welding*, v. 13, Sept. '45, pp. 348-351.

Suggestions regarding maintenance of standard. Check of units to be welded; clamping dies; travel of the moving head; fully automatic machine; possible causes of faulty welding.

22-529. **Under Water Cutting.** Edward T. Forey. *Welding*, v. 13, Sept. '45, pp. 355-359.

Applications of the oxy-hydrogen process. Regulation of gas pressures; alterations to bridges; Tripoli harbor operations.

22-530. **Industrial Application of Automatic Submerged Arc Welding.** R. R. Sillifant. *Welding*, v. 13, Sept. '45, pp. 360-370.

Development of the Unionmelt process. Details of types and scope of the process, indicating future possibilities. (South Wales Institute of Engineers.)

22-531. **Spot and Seam Welding Aluminum.** O. A. Perry. *Light Metal Age*, v. 3, Sept. '45, pp. 10-13.

Discusses the rapid development of spot welding alloys, and current equipment and practices. Peculiar difficulties inherent in this process and methods of overcoming them are considered, and pertinent data given. Advantages of spot welding aluminum summarized.

22-532. **Welding on Mexican Railways.** J. W. Boyd. *Railway Mechanical Engineer*, v. 119, Oct. '45, pp. 435-436.

Material shortages overcome by the extensive use of welding repair and reclamation. Lack of any limiting regulations allowed wide range of applications. Mexicans are skillful operators and the results have been good.

22-533. **Redesign for Welding—Gas Turbine Plant.** J. F. Cunningham. *Industry & Welding*, v. 18, Oct. '45, pp. 38-41, 70.

Extended use of welding in the construction of a gas turbine plant brings up some interesting problems in connection with welding on materials fit for high temperature work.

22-534. **Metal Bonding.** *Automobile Engineer*, v. 35, Sept. '45, pp. 354-356.

Redux process. Strength of the joint is sufficient, even at the high temperatures occasionally developed. Applications; design considerations; processing procedure.

22-535. **Unusual Results With Automatic Soldering.** W. R. Graham. *Machinery*, v. 52, Oct. '45, pp. 158-161.

Eliminating hand work and the need of skill in soldering increased production nearly 450% in one case, and also improved the product.

22-536. **Improved Method of Brazing Carbide Tips to Shanks.** *Machinery*, v. 52, Oct. '45, pp. 192-193.

By using the specially brazed tools, production has increased 42%. Able to obtain from three to ten grinds per tool with increased production per grind.

22-537. **Stainless Steel Welds Improved by Helium Shielded Arc.** W. H. Jones. *Product Engineering*, v. 16, Oct. '45, pp. 708-709.

Advantages of helium shielded arc welding for stainless steel in thin sheets or sections, on which adoption of this method by industry is based. Design of joints outlined.

22-538. **Induction Brazing Becomes a Fabricating Medium.** H. A. Walker. *Production Engineering & Management*, v. 16, Oct. '45, pp. 72-74.

As a result of the application of induction heating techniques, brazing has developed into an important fabricating medium useful in large or small production operations.

22-539. **Some Applications of Atomic Hydrogen Arc Welding.** A. E. Near. *Steel Processing*, v. 31, Sept. '45, pp. 555-559, 585.

Scope of application of atomic hydrogen arc welding processes will inevitably broaden. Describes some specific applications; outlines the basic principles of the process. Cast and wrought aluminum and its alloys; electronic tube fabrication; die repair and fabrication; chain links for crane slings; alloys for high temperature operation.

22-540. **Effect of Recent Research on the Weldability and Control of the Production of Steel Aircraft Tubing.** Arthur J. Williamson. *Aeronautical Engineering Review,* v. 4, Sept. '45, pp. 5, 7, 9, 11, 13, 17, 19-21, 23.

Standard sample—cracking measurements; dilatometer studies; statistical data; metallographic studies; effect of aluminum on steel-making practice; aluminum versus cracking effect of sulphur; cracking of NE steels; post-heating; hardness versus cracking; additional data; steel aircraft tubing.

22-541. **Five Years of Progress in Welding.** W. Spraragen. *Metal Progress,* v. 48, Oct. '45, pp. 905-916.

Weldability problem; weld stress problem; graphitization of steam lines; weldability of specific steels; some arc welding advances; resistance welding; solid phase welding; gas cutting; a look ahead.

22-542. **Mechanical Oxy-Acetylene Welding.** H. O. Jones. *Steel,* v. 117, Oct. 8, '45, pp. 104-106, 146, 148, 152, 154.

Non-continuous setup in plant of Artcrest Mfg. Co. provides economies in fabricating cylindrical steel containers.

22-543. **Methods for Controlling Plate Motion During Flame-Cutting Operations.** G. V. Slottman. *American Machinist,* v. 89, Oct. 11, '45, pp. 114-117.

Skip-cutting, use of taper pins, and clamping procedures for the control of thermal expansion.

22-544. **Precision Cutting of Steel Requires Separate Control.** G. V. Slottman. *American Machinist,* v. 89, Sept. 27, '45, pp. 114-116.

An accurate knowledge of kerf widths, thermal expansion and plate motion are important in precision operations.

22-545. **Recorded Tests Prove Effective in Maintaining Welding Quality.** John Holden. *American Machinist,* v. 89, Sept. 27, '45, pp. 126-128.

Establishment of a quality control program in the welding department relieves the supervisor of keeping a close watch on all operational details and he is in a position to rectify jobs showing poor welds. Two simple forms used.

22-546. **Rubber Inserts Cut Riveting Troubles.** Alex Carlson. *American Machinist,* v. 89, Sept. 27, '45, pp. 129-130.

Shop tests reveal that shock transmitted to the bodies of rivet-gun operators and helpers is reduced sharply by simple changes in guns and bucking bars.

22-547. **Resistance Welding. Part II.** R. W. Ayers. *Aircraft Production,* v. 7, Sept. '45, pp. 446-450.

Equipment for spot welding light alloy material; stitch and projection welding.

22-548. **Welded Construction Reduces Die Cost.** John Mikulak. *Iron Age,* v. 156, Oct. 4, '45, pp. 83-84.

Substitution of welded dies yields excellent results by reducing first cost and increasing die life.

22-549. **Redesign for Welding Non-Ferrous Bellows.** *Industry & Welding,* v. 18, Oct. '45, pp. 46, 48.

Cook Electric Co. manufactures a variety of bellows. Because of the wide range of sensitivity of various metals they have been adapted to solve numerous engineering problems.

22-550. **Shop Notes on Welding Stainless Steel.** Vincent J. Shanahan. *Industry & Welding,* v. 18, Oct. '45, pp. 57, 72-74, 76-78, 80.

No reason for welding operators to hesitate when it comes to welding stainless steel. 18-8 stainless types can be, and are, readily welded by the metallic arc and the acetylene process.

22-551. **Redesign for Flash Welding Alloy Steel Rings.** P. B. Scharf. *Industry & Welding,* v. 18, Oct. '45, pp. 58-62, 64.

Rings, of mild steel, have been produced by flash welding. Process developed to a high production, low cost ring manufacturing method. Products produced, and the techniques employed described.

22-552. **Redesign for Induction Brazing Small Parts.** Charles T. Pearson. *Industry & Welding,* v. 18, Oct. '45, pp. 84-89.

Brazing, at one time associated with minor emergency repair jobs, has become a more important medium for fabrication of metal parts with the increased use of induction heating and brazing alloys.

22-553. **The Weld Stress Problem.** *Canadian Metals & Metallurgical Industries,* v. 8, Sept. '45, pp. 30-32, 34-35, 47.

Factors leading to the formation of stresses are briefly reviewed. Assuming a crack-free structure, although containing high residual stresses, the weld stress problem is carefully considered and broken down into its essential elements.

22-554. **Safety Factors in Arc Welding.** R. F. Wyer. *Metals & Alloys,* v. 22, Sept. '45, pp. 742-747.

How the highly overrated electrical shock hazard in the arc welding process may be reduced through simple precautions.

22-555. **Twin-Arc System Improves Welding Efficiency.** M. H. MacKusick. *Iron Age,* v. 156, Sept. 27, '45, pp. 58-59.

Warping and residual stresses in the welded joints for ship plates have been materially reduced by the Twin-Arc welding technique. Various passes are made simultaneously from both sides of the joint, cracking of the root pass is avoided, and back chipping eliminated.

22-556. **Layout of a Welding Shop.** T. Scott Glover. Institute of Welding *Transactions,* v. 8, Aug. '45, pp. 93-99.

The welding shop and plant layout from a general engineering point of view. Outlines a specific example drawing attention to the consideration involved and the reasons for the arrangement as carried out.

22-557. **New Developments in Technique of Deep Penetration Welding.** Barry W. Silverwood. Institute of Welding *Transactions,* v. 8, Aug. '45, pp. 101-108.

Practical applications to unprepared or semi-prepared plate butts. High speed, high current, butt welding in steel plate.

22-558. **Deep Penetration Welding on Plates Over 0.350 In. Thick.** D. M. Kerr. Institute of Welding *Transactions,* v. 8, Aug. '45, pp. 109-111.

Experience of welding applied to ship construction. X-rays of typical welds discussed.

22-559. **Constitution of Weld Metals.** W. Andrews. Institute of Welding *Transactions,* v. 8, Aug. '45, pp. 119-132.

Results of research arising from practical problems. General chemical analysis of the weld metal of representative commercial electrodes; detailed examination of selected weld deposits; examination of metallic arc weld deposits made by anhydrous fluxes; microstructure and constitution; effects and reactions.

22-560. **Some Electrical Characteristics of Spot Welding Machines.** C. L. Railton and A. J. Hipperson. *Sheet Metal Industries,* v. 22, Sept. '45, pp. 1609-1617.

Investigations to determine to what extent the secondary current of a spot welder is affected by various conditions of the secondary loop, i.e., by throat depth and throat opening, and by the amount of magnetic material in the throat. Results of the tests reported.

22-561. **The Welding of Non-Ferrous Metals. VI. Resistance Welding Equipment Principles and Control Methods.** E. G. West. *Sheet Metal Industries,* v. 22, Sept. '45, pp. 1618-1622, 1624.

Alternating current machines; control methods for a.c. machines; power supply; condenser-discharge welding machines; induction storage machines; other resistance welding machines. 5 ref.

22-562. **Container Line.** *Steel,* v. 117, Oct. 15, '45, pp. 112-113, 154.

Unusually effective setup that makes 35-in. longitudinal welds at rate of 400 hourly, using submerged arc process.

22-563. **Produces Over 19,000 Miles of Electric Welded Tubing.** *Steel,* v. 117, Oct. 15, '45, pp. 114-115, 144, 146.

Two mills make tubes ¾ to 4 in. diameter at rate of 4000 tons a month. Scale-free skelp is fed into sizing mill where by mechanical control it is brought to the required thickness. Butt welding ends together affords continuous operation of mill. Rigid inspection and testing maintained.

22-564. **Steel Plant Welding.** W. K. Simon. *Iron & Steel Engineer,* v. 22, Sept. '45, pp. 92-96.

Examples of welded construction in steel plant equipment which demonstrate many possibilities of economy.

22-565. **Composite Generator Frames.** G. W. Birdsall. *Steel,* v. 117, Oct. 22, '45, pp. 114-118.

Jack & Heintz develops highly effective setups for mass production of cylindrical frames for electric generators for aircraft. Three ring sections are welded into a single piece by automatic submerged arc. Six openings near each end are cut out on automatic multiple torch machine with special indexing fixtures.

23. INDUSTRIAL USES AND APPLICATIONS

23-244. **Lead and Solder Wire.** *Wire Industry,* v. 12, Sept. '45, pp. 477-478.

Production methods and uses.

23-245. **Aluminum in the Electrical Industry.** M. C. Rowland. *Light Metal Age,* v. 3, Sept. '45, pp. 14-15, 49-50.

Important properties of aluminum other than light weight which give it great advantages in various electrical applications. Knowledge of these properties is valuable to the fabricator and may suggest other applications.

23-246. **Die Castings Extensively Used in Variable Speed Drive Redesign.** *Product Engineering,* v. 16, Oct. '45, pp. 660-662.

Although the necessary casting dies required a large investment, tooling costs are lower, and machining time is reduced. After making a reasonable allowance for tool amortization, over-all cost reduction is estimated to be about 60%.

23-247. **Fine Pitch Gears, II.** *Product Engineering,* v. 16, Oct. '45, pp. 710-713.

Deals with worms, worm gears, bevel gears, and backlash in gears.

23-248. **The Light Alloy Automobile.** *Light Metals,* v. 8, Sept. '45, pp. 417-426.

Practical advances projected in France during the past few years, special reference being made to the Mathis car. Use of light alloys in small automobiles, and the practical results of reduction of weight and drag.

23-249. **Light-Metal Boats.** *Light Metals,* v. 8, Sept. '45, p. 435.

Novel methods of construction developed during the past five years in Switzerland.

23-250. **Light Alloys in Motorized Bicycles and Motorcycles.** *Light Metals,* v. 8, Sept. '45, pp. 448-458.

Comprehensive survey based on accounts appearing in earlier issues brought up to date with additional matter, and including the results of a re-examination of some controversial issues.

23-251. **Light Alloys in Rectifiers, Photocells and Condensers.** *Light Metals,* v. 8, Sept. '45, pp. 459-462.

Impregnating media employed in the manufacture of fixed paper condensers. Electrical properties, chemical, physical and mechanical characteristics of these media are examined.

23-252. **Precision Gears by High Production Methods.** John T. Smith. *Production Engineering & Management,* v. 16, Oct. '45, pp. 67-71.

Utilizing modern machines and modern methods, automotive engineers set new production records in turning out nearly 100 different types of high precision aircraft engine gears.

23-253. **Streamlined Production of Opposed Piston Diesel Engines.** *Production Engineering & Management,* v. 16, Oct. '45, pp. 78-89.

Special purpose tools and refined methods increase output and improve quality.

23-254. **Processing and Fabrication of Stainless Steel.** *Steel Processing,* v. 31, Sept. '45, pp. 567-573.

In processing and fabricating stainless steel sheets special practices apply which differ from those established for softer metals. Special characteristics which distinguish stainless steels from other metals. Shearing; forming; joining; machining; finishing.

23-255. **Manufacture of Close Tolerance Bolts.** *Aero Digest,* v. 51, Oct. 1, '45, pp. 66-67.

Raw material analyzed; heat treat sequence; second heat treatment; two passes of grinder.

23-256. **Lighter Engines From Stronger Alloys.** Carl T. Doman. *Aero Digest,* v. 51, Oct. 1, '45, pp. 87-88.

Advent of the higher strength gray iron alloys has opened a new approach to low cost, lightweight aircraft engine design.

23-257. **Magnesium and the Man on the Sreet.** T. W. Atkins. *Modern Metals,* v. 1, Oct. '45, p. 7.

Possibilities where magnesium products are suggested for use.

23-258. **Thin Magnesium Strip.** H. W. Porth. *Modern Metals,* v. 1, Oct. '45, pp. 13-18.

Thin gage or "Thinstrip" magnesium has been used advantageously for specific applications during the war. In the future, it may find usage for such instruments as pointers, damping vanes and moving "condenser" plates. Properties, fabrication, joining and uses of Thinstrip.

23-259. **Aluminum Butter Churns.** *Modern Metals,* v. 1. Oct. '45, pp. 24-25.

Why cast aluminum is used for butter churns.

23-260. **Alloy Steels for Maintenance.** J. A. Rosa. *Iron & Steel Engineer,* v. 22, Sept. '45, pp. 37-46.

Though perhaps higher in first cost, alloy steels save in replacement costs and in delay time. Their successful application requires intelligent analysis of duty requirements.

23. INDUSTRIAL USES (*Cont.*)

23-261. **Die Castings Solve Current Problems in Electrical Manufacturing.** *Die Casting*, v. 3, Oct. '45, pp. 21-23, 46-47.

Die castings hold their place in competition with stampings, plastic moldings, sand castings and other high-production elements and gain preference on some scores as engineers in the electrical manufacturing industry become better acquainted with the benefits obtainable by designing for their use.

23-262. **Shocking Experience.** *Die Casting*, v. 3, Oct. '45, pp. 24-25, 61-62.

Operational efficiency and mechanical functions of the die castings used in aircraft armament indicate that their application can be considered where shock, vibration and extreme temperature variants must be tolerated.

23-263. **Eight Thousand Tons to Hold.** *Die Castings*, v. 3, Oct. '45, pp. 26-28, 54-56.

Die castings in railroad air brake equipment meet service requirements that are as severe as can be found under any conditions. Designs call for thick wall sections to withstand shock and vibration. Some of the components are among the heaviest die castings made.

23-264. **Die Castings in the Redesign of a Variable Speed Drive.** L. E. Jones. *Die Casting*, v. 3, Oct. '45, pp. 30-32, 34, 36, 48-49.

Using die castings instead of cast iron components in the redesign of this variable speed drive, manufacturing costs were reduced by more than 60%. The new model is more compact, lighter in weight, and outperforms the previous design.

23-265. **Carbon and Graphite for Mechanical and Electrical Parts.** F. J. Vosburgh. *Metals & Alloys*, v. 22, Sept. '45, pp. 721-726.

Properties and uses of standard, porous and impregnated carbon and graphite for a variety of products.

23-266. **Primary Factors in Choosing Aircraft Engine Materials.** Colin Carmichael. *Machine Design*, v. 17, Oct. '45, pp. 111-114.

Materials used by five of the leading aircraft engine manufacturers for 18 critical parts are compared, and the reasons for their selection; processes used in their fabrication discussed.

23-267. **Materials Problems in Gas Turbine Design.** J. F. Cunningham and R. A. Riester. *Machine Design*, v. 17, Oct. '45, pp. 119-122.

How the materials problems were solved in the case of the 2500-hp. gas turbine power plant recently built by Elliott Co. for the U. S. Navy. Design measures which had to be taken to minimize effects of distortion due to temperature differences, as well as to protect certain parts from excessive heat, explained. Leading characteristics of design and the factors affecting the choice of cycle.

23-268. **Selecting Materials for the Jeep. Part I.** Rogert F. Mather. *Machine Design*, v. 17, Oct. '45, pp. 141-144.

Stresses general factors of importance in the selection of materials for all types of machines.

23-269. **Metal for a New Age.** W. J. Passingham. *Machinery* (Lloyd), v. 17, Sept. 1, '45, pp. 55-58.

Aluminum for prefabrication.

24. DESIGN

24-87. **An Accurate Method for Laying Out Involute Gear Teeth.** L. Wilson. *Machinery* (London), v. 67, Sept. 13, '45, pp. 292-293.

Optical projector provides a useful means of checking the profile of the teeth of small gears and pinions. Indicates a method by which accurate charts of enlarged-tooth forms can be made.

24-88. **Light Alloys in Structural Engineering.** *Light Metals*, v. 8, Sept. '45, pp. 463-468.

Theory and practice of light design with and without the use of light alloys, indicating the special features of structures in the latter materials. (Koenig *Technische Rundschau*, no. 32 and 33, Aug. 4 and 11, '44.)

24-89. **Design of Tools and Fixtures.** *Machinery*, v. 52, Oct. '45, pp. 189-191.

Automatic hopper-fed knurling fixture; gage for checking special screw threads by single-wire method.

24-90. **Method of Evaluating Test Data Aids Design of Rotary Pumps.** Warren E. Wilson. *Product Engineering*, v. 16, Oct. '45, pp. 653-656.

Principles of a method for analyzing data obtained by testing rotary positive displacement pumps and motors that graphically enumerates the effects of all design factors which influence performance. Method developed on the basis of the elementary theory underlying the mechanics of hydraulic pumps and motors.

24-91. **Internal Wrenching Bolts Design Data and Uses.** L. J. Catlin. *Product Engineering*, v. 16, Oct. '45, pp. 714-715.

High strength internal wrenching bolts described. Advantages of these bolts when used to replace standard hexagon head bolts in shear and tension attachments discussed.

24-92. **Basic Relationships of Bevel Gears.** Ernest Wildhaber. *American Machinist*, v. 89, Sept. 27, '45, pp. 99-102.

Basic bevel gear formulas are rederived. Profile sliding treated in a new way.

24-93. **Do's and Don'ts in Die Casting Design. Part I.** *Die Casting*, v. 3, Oct. '45, pp. 58-60.

Tips on the design of die castings.

24-94. **Experimental Stress Analysis Improves Design.** Martin A. Erickson. *Tool Engineer*, v. 15, Oct. '45, pp. 18-26.

New approaches, breaking with traditional methods of design, result in greater structural strength with less material.

24-95. **The Elements of Gearing.** *Tool Engineer*, v. 15, Oct. '45, pp. 38-39.

Discusses tooth forms and the elementary arithmetic of gears.

24-96. **Designing Computing Mechanisms. Part III.** Macon Fry. *Machine Design*, v. 17, Oct. '45, pp. 123-128, 186.

Cam mechanisms offer simple method; avoiding undercut; how the master cam is made; cutter movement corresponds to follower motion; disk cam is most compact type; how three-dimensional cam works; a powerful computing tool; employing several gear cams in series; cutting the teeth of non-circular gears; tape wheels can use helicoidal surfaces.

24-97. **A New Drawing Office Appliance.** *Aircraft Engineering*, v. 17, Aug. '45, pp. 242-244.

Technique, which includes a machine that cuts 50 to 80% off the time required to prepare a trimetric drawing and four new drawing instruments, that offer promise of considerable simplification.

25. MISCELLANEOUS

25-112. **In Search of Aluminum.** *Light Metals*, v. 8, Sept. '45, pp. 436-444, 445-447.

Being the record, with reflective commentary in lighter vein, of an unusual journey, made under somewhat awkward conditions, through territory turned inside out and upside down by war, and left high and dry by peace.

25-113. **Material Collection by Wet Separation.** *Sheet Metal Worker*, v. 36, Sept. '45, pp. 55-57.

Expanded field seen for removal of dust, fumes, paint collection, etc., by the wet principle.

25-114. **Jet Bomber Armament.** R. A. Averitt. *General Electric Review*, v. 48, Oct. '45, pp. 51-55.

Greater speeds and greater power characterizing these airplanes necessitate a new approach to the armament problem. Jet-propelled airplanes; growth of defensive armament; a specific airplane; turrets; sights; computers.

25-115. **Applied Research.** Harry R. Ricardo. Institution of Mechanical Engineers *Journal*, v. 152, Sept. '45, pp. 143-148.

Instrumentation; research and industry; design; invention; research laboratories.

25-116. **Films Tell Story of New Techniques.** *Production Engineering & Management*, v. 16, Oct. '45, pp. 108, 110, 205.

Industrial movies graphically describe advances made in use of new engineering materials and new methods of economically shaping and assembling as America turns to output of civilian goods.

25-117. **Mass Production Layout for Manufacture of Rocket Projectiles.** W. G. Miller. *Steel Processing*, v. 31, Sept. '45, pp. 563-566.

Materials handling and metal working techniques.

25-118. **Government Support of Research.** Vannevar Bush. *Product Engineering*, v. 16, Oct. '45, pp. 649-652.

Five basic principles to be followed in the organization and operation of proposed agency.

25-119. **Layout of Experimental Gas Turbine Unit.** R. A. Riester. *Blast Furnace & Steel Plant*, v. 33, Oct. '45, pp. 1274-1276.

Air for turbine; efficiencies; turbine temperatures.

25-120. **The Facts About Atomic Energy.** A. H. Allen. *Steel*, v. 117, Oct. 1, '45, pp. 112-114, 148, 150, 152, 154, 156, 158, 160, 162.

Strange behavior; speed is complication; neutrons and protons; chain reaction; DSM project; materials $44,000 a ton; low-cost method; control by slots; atomic power?—yes, but at a price; plutonium a mystery; grams from tons; shielding against radiation; unequal fission masses; a $2,000,000,000 gamble; gaseous diffusion; barriers are a problem; huge steam plants; electromagnetic separation; separation by thermal diffusion; chain reaction hinges on critical size.

25-121. **Maintenance and Repair of Lifting Magnets.** V. E. Holtslander. *Iron & Steel Engineer*, v. 22, Sept. '45, pp. 65-69.

Presenting a number of practices that have resulted in longer and more efficient magnet service.

25-122. **Steel Plant Maintenance.** D. S. McLean. *Iron & Steel Engineer*, v. 22, Sept. '45, pp. 75-78.

Successful maintenance requires thorough training of personnel, regular inspection and reports, intelligent management of spares, advance planning of jobs, and close cooperation with operating and engineering departments.

25-123. **Maintenance Symposium.** *Iron & Steel Engineer*, v. 22, Sept. '45, pp. 79-89, 91.

Maintenance; mechanical maintenance in steam-electric generating stations; electrical maintenance; instruments in the steel industry; lubricants in maintenance; maintenance of flow meters.

25-124. **Standardized and Simplified Handling.** George E. Stringfellow. *Steel*, v. 117, Oct. 22, '45, pp. 106-107, 144, 146.

Exceptionally efficient handling methods take care of movement in processing huge quantity and variety of materials. Program is developed for effective plant layout to promote ease and safety in handling operations.

26. STATISTICS

26-138. **Magnesite and Other Magnesium Compounds in 1944.** *Refractories Journal*, v. 21, Aug. '45, pp. 320-325.

Statistics of the magnesite industry in the United States, 1941-44.

26-139. **The Future of Metals.** Robert S. Palmer. *Mines Magazine*, v. 35, Aug. '45, pp. 403-407.

High grade, low grade and potential ore; large mineral reserves; future for metal supply good; metal supply depends on price; reserve of manganese large; no cause for alarm at rate of mineral depletion.

26-140. **China's Steel Industry.** Henrik Ovesen. *Mechanical Engineering*, v. 67, Oct. '45, pp. 670-671.

Informal comments on the Nelson Mission and an expression of China's appreciation.

26-141. **Latin American Industrial Expansion Boosts Demands for Machine Tools.** J. Sewart McCain and George Loinaz. *American Machinist*, v. 89, Sept. 27, '45, pp. 103-107.

Report on the condition of Latin America's metal-working industries; new steel plant; foundry shops scattered; tubing production small; new industries starting; technical training increases.

26-142. **The Progress of Magnesium and Its Alloys in Britain—1924-1945.** C. J. P. Ball. *Metallurgia*, v. 32, Aug. '45, pp. 153-159.

Magnesium is generally available on the earth's surface in the form of magnesite or magnesium carbonate in dolomite, of which latter there are enormous deposits in the British Isles. Since 1938, methods have been worked out and plants are in operation in Britain for leaching out magnesium oxide from dolomite by the use of sea-water so that magnesium metal and alloys have now become an all-British product.

26-143. **Dwindling Tin Supplies and the Problem of Reconversion Facing the United States. Part I.** *Metals*, v. 16, Sept. '45, pp. 6-9, 14.

War Production Board issues comprehensive survey of situation and concludes that control over consumption of metal must be continued.

26-144. **Canada's Metal Production, Stimulated by War Needs, Reached Unprecedented Levels.** *Metals*, v. 16, Sept. '45, pp. 10-14.

Country is greatest producer of nickel, asbestos, platinum and radium; second largest producer of gold, aluminum, mercury and molybdenum; third largest producer of copper, lead and zinc.

26-145. **London Metal Outlook Obscure Following Victory—Many Major Changes in Offing.** L. H. Tarring. *Metals*, v. 16, Sept. '45, pp. 15, 17.

Return to peace will affect consumption, allocation and distribution. Trade awaits government's new policies.

26-146. **OPA Retains Tight Grip on Metal Prices Whereas WPB Continues to Relax Controls.** *Metals*, v. 16, Sept. '45, pp. 18-21.

Truman favors stockpiling legislation; Senators suggest getting strategic metals abroad in return for loans; Italy seeks copper.

26-147. **What's New in Non-Ferrous Metals?** Archibald Black. *Machine Design*, v. 17, Oct. '45, pp. 129-132, 188, 190, 192.

Discusses only non-ferrous metal developments of the last ten years and was inspired by appreciation of the necessity for knowing at least something about recent changes in the kaleidoscopic materials picture; aluminum; magnesium; beryllium; cemented carbide; porous chromium surfacing; die casting materials; silver bearings; laminated metals.

27. NEW BOOKS

27-143. **Symposium on Stress-Corrosion Cracking of Metals.** 500 pp., American Institute of Mining & Metallurgical Engineers, 29 West 39th St., New York 18, N. Y. $7.50.

Thirty papers presented at the joint symposium held in November 1944 by the A.I.M.E. and American Society for Testing Materials. Deals with stress-corrosion test methods and best results for brass, aluminum, magnesium and stainless steel; theory and mechanism of stress-corrosion cracking; season cracking of cartridge brass.

27-144. **Handbook of Non-Ferrous Metallurgy; Principles and Processes.** Donald Macy Liddell, Editor. 2nd Edition, 667 pp., illus., diagr. McGraw-Hill Book Co., 330 W. 42nd St., New York. $3.75.

The chapter on metallography has been deleted and one on drying, added.

27-145. **Internal-Combustion Engines: Theory and Design.** Vladimir Leonidas Maleev. 2nd Edition, 648 pp., illus., diagrs. McGraw-Hill Book Co., 330 W. 42nd St., New York. $5.00.

The material has been amplified and the theoretical discussion has been strengthened.

27-146. **Ebene Grundwasserstronungen mit Freier Oberflache.** Max Breitenoder. 133 pp., illus. J. W. Edwards, Ann Arbor, Mich. $4.85.

27-147. **Electric Motors and Generators and Related Drives.** Edwin Stoddard Lincoln. 389 pp., illus., diagrs. (Essential Books, Modern Electrical Series), Duell, Sloan and Pearce, New York. $3.00.

The types, uses and construction of motors for the production of commercial electric power.

27-148. **Electrical Measuring Instruments: Measurement and Surveys.** 291 pp., illus., diagrs. (Essential Books: Modern Electrical Series), Duell, Sloan and Pearce, New York. $3.00.

Principles of industrial electric measuring instruments, with tables.

27-149. **Industrial Electric Lamps and Lighting.** Edwin Stoddard Lincoln. 351 pp., illus., diagrs. (Essential Books: Modern Electrical Series), Duell, Sloan & Pearce, New York. $3.00.

Standards for industrial electric light and technical explanations of the circuits and installations.

27-150. **Electrical Protective Equipment and Power-Factor Correction: Fire Protection and Fire Fighting Equipment.** 251 pp., illus., diagrs. (Essential Books: Modern Electrical Series), Duell, Sloan and Pearce, New York. $3.00.

Devices and methods of protecting electrical circuits and equipment from fire.

27-151. **The Fundamentals of Electronics and Their Applications in Modern Life.** Henry Lionel Williams. 242 pp., illus., diagrs. New Home Library, Philadelphia. $0.69.

The elementary aspects of electron therapy and the tools of electronics and the applications of electronic devices.

27-152. **Diesel-Electric Plants.** Edgar Jesse Kates. 2nd Edition., 272 pp., illus., diagrs. American Technical Society, Chicago, Illinois. $3.75.

Greatly enlarged and revised to bring the text up to date with developments of the past nine years.

27-153. **The Technology of Plastics aand Resins.** J. Philip Mason and Joseph F. Manning. 501 pp., illus., diagrs. D. Van Nostrand Co., New York, N. Y. $6.50.

A textbook presupposing courses in general chemistry and organic chemistry, and covering both the chemistry and the practical utilization of plastics and resins.

27-154. **The Electrolytic Capacitor.** Alexander M. Georgiev. 203 pp., illus., diagrs. Murray Hill Books, New York, N. Y. $3.00.

The construction, manufacture, function and testing of dry and wet electrolytic capacitors or condensers.

27-155. **Code of Minimum Requirements for Instruction of Welding Operators. Part A—Arc Welding of Steel $\frac{1}{8}$ to $\frac{3}{4}$ In. Thick.** 83 pp., illus., American Welding Society, 33 West 39th St., New York, N. Y. $0.50.

Revised edition, prepared by Committee on Minimum Requirements of Instructions for Welding Operators in Trade Schools. Prescribes equipment and facilities for the school, exercises and topics for lecture and discussion.

27-156. **Bibliography on Industrial Radiology.** Herbert R. Isenburger. 16 pp., mimeo., St. John X-Ray Service, Inc., 30-20 Thomson Ave., Long Island City 1, N. Y. $1.00.

Addenda to "Industrial Radiology." About 400 references, 1942-1945.

27-157. **Ball and Roller Bearing Engineering.** Arvid Palmgren. 270 pp., diagr., SKF Industries, Inc., Front St. and Erie Ave., Philadelphia 34, Pa.

A fundamental text. Common bearing types; forces and motions in bearings; the carrying capacity of ball and roller bearings; bearing selection; design of bearing applications; mounting and dismounting; lubrication and maintenance; bearing failures; tables.

27-158. **Metal Fabrication by Risdon.** 129 pp., illus., Risdon Mfg. Co., Naugatuck, Conn.

A manufacturer's story of metal components, formed wire products and safety pins.

27-159. **Uranium and Atomic Power.** Jack DeMent and H. C. Dake. 343 pp., illus., Chemical Publishing Co., Inc., 26 Court St., Brooklyn 2, N. Y. $4.00.

Atomic power; the uranium minerals; prospecting for uranium minerals; the physics of uranium; chemistry of uranium; specific methods in uranometry; appendix on the atomic bomb.

EMPLOYMENT SERVICE BUREAU

The Employment Service Bureau is operated as a service to members of the American Society for Metals and no charge is made for advertising insertions. The "Positions Wanted" column, however, is restricted to members in good standing of the ASM. Ads are limited to 50 words and only one insertion of any one ad will be printed. Address answers care of ASM, 7301 Euclid Ave., Cleveland 3, Ohio, unless otherwise stated.

POSITIONS OPEN

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RESEARCH DIRECTOR: Long established eastern company specializing in special steels needs assistant to director of research. Preferred age 27 to 30. Box 11-355.

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MATERIALS AND PROCESS SPECIFICATION ENGR.: 4 yrs. exp., desires position as materials or process spec. writer with midwest mfr. B.S. in Chem., minors in physics, math. 3 yrs. drafting and 4 yrs. business exp. Age 33, 2 dependents. Box 11-40.

METALLURGICAL ENGR.: B. S. Chem. Eng., age 27, married. Exp. matls. eng., plant operation, production, quality control; ferrous and non-ferrous. Desires responsible position with opportunity to show ability and initiative for company having interests in South America. Available on short notice. Box 11-45.

HEAT TREAT FOREMAN: Age 28. Knowledge of met. and metallog. Exp. forgings, tool and die hardening, ferrous and non-ferrous. Excellent references. Practical man; modern methods. Box 11-50.

METALLURGICAL ENGR.: Desires position with U. S. firm expanding in South America, pref. Brazil. Capable of assuming full responsibility for met. dept. in fabricating plant. Grad. met., age 37; 14 yrs. exp. Present position chief met. Box. 11-55.

SALES MANAGER: For steel company whose products are tool steel, stainless, and alloy steel. 20 yrs. sales exp., capable of consulting eng. and tech. advice necessary to advise personnel, and service indus. plants. Box 11-60.

DEVELOPMENT METALLURGIST: Age 29, wide exp. and highest ref. from leaders in ferrous field; desires to contact medium-sized progressive firm planning on establishing or expanding res. and devel. facilities. Desires position res. and devel. director. Box 11-65.

METALLURGICAL ENGR.: Grad. ceramics and met. Exp. with large alloy and stainless steel producer. Also exp. in supervision with mass production ferrous and non-ferrous machining and fabrication. Res. and devel. engr. with large Univ. lab. associated with Manhattan Project. Desires position in sales or sales engr. Age 26. Box 11-70.

HEAT TREAT SUPERVISOR: 30 yrs. exp. automotive, aircraft and diesel engine parts; also hardening high speed and carbon steel tools and dies; some electroplating exp. Good ref. as to ability to organize and produce. Available at once. Box 11-75.

METALLURGICAL ENGR.: At present res. dir. of Eastern firm, wishes to relocate in Chicago-Milwaukee area. Age 35; B.S. in Ch. E., M.S. in Met. Eng. Ten years exp. stainless and alloy steels; electroplating, ceramics, aluminum. Both res. and practical minded. Professional man. Box 11-80.

TECHNICAL OR SALES: Age 39, able to adapt easily to new conditions. Last position eng. dept. and res. lab. large firm. Exp. machine shop and inspection, quality control, drafting room procedure, purchase and sales; electromechanical apparatus, refrigeration, controls and instrumentation. Salary $7500. Box 11-85.

CHEMIST: Supervising; exp. fabrication of Al; matls. and spec. engr.; heat treat Al and steel; analytical control; teaching and editing. Box 11-90.

METALLURGIST-CHEMIST: A.B. and M.S. in Chem., 1928; 17 yrs. exp. chief met. and chem. Desires devel. and administration of chem. and met. control methods and procedures related to raw matls. and processes. Able to organize and supervise chem. and met. dept. with full responsibility for carrying out policies and procedures. Box 11-95.

SALES ENGINEER: 2 yrs. exp. devel. silicon steels. Two yrs. in Army on specifications and allocations of all types alloy steels. Advanced from 2nd Lt. to Major while in Army. Age 27; expected salary $4000. Box 11-100.

RESEARCH DIRECTOR: Or res. met. and chem., non-ferrous. Ph.D., State Univ. 6 yrs. exp. chem. and met. non-ferrous espec. beryllium, Cu, Ni; melting and foundry practice, heat treat, fabrication, inspection; important met. phases of Manhattan Project. 3 yrs. teaching and res. asst., would consider position as prof. of met. Box 11-105.

SENIOR METALLURGIST: B.S. math and physics, 38; courses in met. 1940. Exp. both ferrous and Al, investigation of failures, production. Patents, publications, production awards for ideas. Box 11-110.

CHIEF METALLURGIST: B.S. Met. Eng., 38, Columbia; 7 yrs. exp. medium, low alloy SAE and NE steels, cast iron, heat treat theory and practice. Has advanced new theory in heat treat which was published and provided basis for patenting new technique. Box 11-115.

METALLURGIST: B.S. in Met. Eng., Montana School of Mines; 9 yrs. exp. mining and ore dressing; also production eng., heat treat ferrous and non-ferrous, lab. and inspection depts. Would like position with mining or ore dressing equipment organizaton. Box 11-120.

CHEMIST: Present position asst. lab. director, responsible for lab. employing 40 technicians; quality control over Al, Cu, steel electroplating, anodizing, paints, rust preventives. Age 31, B.S. in Chem. Would like position as chief chem. or ferrous met. Box 11-125.

CHIEF METALLURGIST: Age 35, B.S. in Met., M.I.T. Exp. as supervisor met. inspection dept. and eng. dept. responsible for matls. and parts; control and devel. of special processes. Originated method of saving strategic metal now in common use. Would like to head control lab. Box 11-130.

QUALITY ENGINEER: Or production met. B.S. in Met., Case School, 1930. Exp. tubing, fabricating and machine parts; organized and developed quality control dept. and standards. Box 11-135.

METALLURGIST: Registered engr. (Ohio). Exp. heat treat, failure analysis, matl. inspection, foundry practice, physical tests, matl. selection. Desires position as trouble shooter or consultant. Age 30; willing to travel. Box 11-140.

HEAT TREAT FOREMAN: 15 yrs. practical exp.; 4 yrs. met. training; also worked in forging and spring shop. Familiar with all types of steel and heat treat; has built and patented furnaces. Quick, competent, self-confident. Box 11-145.

PLANT SUPERINTENDENT: Long exp. supervision of equip., installation, tool design, operation, job evaluation and personnel. Capable of organizing and developing new departments or plants. Would consider opportunity in South America. Box 11-150.

METALLURGIST: 17 yrs. exp. Al industry, both producers and fabricators; also served in Al Div. WPB. Thorough knowledge of commercial as well as technical aspects, production and sales problems. Grad. Mich. Col. Mining & Tech., 1928. Box 11-155.

RADIOGRAPHIST: Exp. fluoroscopy and X-ray of Al and Mg. Able to handle personnel and establish techniques and procedures; supervise routine examination of castings and quality control check to improve foundry practice. Box 11-160.

HEAT TREAT FOREMAN: Age 32. Complete working knowledge of all heat treat methods and trouble shooting, mech. test., ferrous and non-ferrous, much res. on hardenability. Box 11-165.

CHEMIST-METALLURGIST: Metal and metal finishing. B.S. in Chem. Rensselaer, 1937; supp. grad. courses. Capable of planning, establishing and operating lab. Exp. chem. anal., phys. testing, radiography, photomicrography, heat treat. Exp. electroplate, paint, finishes. Box 11-170.

METALLOGRAPHER: Exp. phys., mech., chem. testing of metals; would like position as head of phys. test lab. or chief metallographer. Capable of ordering equip. and establishing procedures. Box 11-175.

FOREMAN MET. INSPECTION: 10 yrs. exp. spark test, magnaflux, hardness. Able to supervise maintenance, repair and calibration of equipment. 3 yrs. night school mech. eng. Box 11-180.

SUPERVISOR OF INSPECTION: Aircraft or electrical field, or forming of sheet metal. 5 yrs. exp. gen. foreman inspection, capable handling personnel. Had own successful business for 4 yrs. in elec. construction. Box 11-185.

HEAT TREAT FOREMAN: Age 27; exp. all kinds heat treat, metallography; cyaniding, carburizing, austempering, salt pot and isothermal treatments. Also oxy-acetylene welding and cutting. Box 11-190.

PROCESS ENGINEER: B.S. Ch.E., 1938. Exp. develop. and res., analysis, ferrous and non-ferrous. Interested in selling tools and equipment. Box 11-195.

METALLURGIST: Testing, consulting, res. and devel. B. Ch. E., 1938. Exp. matls. testing, failure anal., quality control, customer contact, editing and writing reports. In last position supervised 50 technicians and engrs. Diversified work. Box 11-200.

METALLURGIST: Grad. Montana School of Mines, 1942. Exp. phys. met., metallog. testing, failure anal., heat treat. Training geol. eng. Interested in foreign duty, particularly South America. Box 11-205.

SALES ENGR.: 8 yrs. exp. combustion and indus. engr., indus. furn., controlled atmospheres, fuels. B.A. degree, math and physics; 4-yr. night course in phys. met., ind. chem. Interested in indus. furn., insulating refractory or fabricated steel lines. Box 11-210.

WELDING RESEARCH ENGR.: B.E. Ch.E., 1937; B.S., 1935; grad. courses in adv. phys. met. 7 yrs. exp. welding problems in fabrication of piping, valves, fittings, plumbing and heating. Would like either res. or sales eng. Box 11-215.

METALLURGICAL ENGR.: B.S. Met Eng. Lehigh, 1934. Exp. devel. age hardening nonferrous alloys, supervision quality control, ferrous and non-ferrous production problems involving machining, plating, heat treat, powder met. Box 11-220.

METALLURGIST: B.S., grad. work in met. 7 yrs. exp. inspection and testing; weldments and castings, projectiles, gun tubes; spec. of matls., establishments of standards, quality control. Box 11-225.

QUALITY SUPERVISOR: Or chief inspector. Exp. gages, guns, carburetors, engines, misc. parts. Mature, hard working. Capable of improving quality of product and reducing operating costs. Box 11-230.

PLANT METALLURGIST: Age 31; B.A., Chem. & Met. Exp. tech. control including welding, X-ray, Magnaflux, anal., acceptance standards, foundry, heat treat, electroplating. Plant exp. in heat treat, pyrometry, mill and open-hearth supervision. Box 11-235.

METALLURGICAL ENGR.: B.S. Met. Eng. 1944. Exp. res. and devel., metallography, X-ray diffraction, phys. met., testing, instrument calibration. Box 11-240.

PLANNING ENGR.: 29 yrs. exp. steel mill inspection, control, matls. Born in Poland, came to U. S. 1944, first Citizenship papers. M.S. degree; foreign languages. Box 11-245.

METALLURGICAL ENGR.: B.S. Met. Eng. 1942. Exp. bearing matls., heat treat, induction heating, engine failure anal., sub-zero treatment. Foreign languages, report writing. Would like either production or research. Box 11-250.

METALLURGIST: B.S. in Chem., age 29. Exp. tech. process eng., heat treat, plating, painting, met. control and inspection, also steel mill exp. Would like tech. sales. Box. 11-255.

METALLURGIST: Expert on heat treat and aging of aluminum; also heat treat alloy steels, test methods, design, matls. Box 11-260.

CONTACT METALLURGIST: B.S. Met. Eng., Carnegie Tech, 1940. 5 yrs. exp. steel mills; has had direction and supervision of heat treat and testing on armor plate, trouble shooting. Box 11-275.

METALLURGIST: Exp. as inspector of eng. matls.; drafting, computing, plotting; 15 yrs. selling exp. Age 49; chemical diploma Pratt Inst., evening courses in heat treat and met. Box 11-280.

METHODS & PRODUCTION ENGINEER: 3 yrs. exp. foreman of forge shop and heat treat dept., quality control, methods, layout; 2 yrs. proprietor of forge shop; 1 yr. indus. & methods engr., cutlery. Age 35. Box 11-285.

CHIEF METALLURGIST: Exp. installing large heat treat, plating, impregnating and oil reclaiming depts., up-to-date lab., large personnel, aircraft ind. Also 7 yrs. exp. met. and open-hearth supt. stainless field. Box 11-290.

METALLURGICAL ENGINEER: Grad. 1934, 11 yrs. steel mill exp. in met. process control, devel. and res. Fully experienced in production and cost control, specifications, heat treat, metallog., and sales. Desires responsible position with steel company or steel fabricating concern. Box 11-300.

MELTING SUPERINTENDENT: 19 yrs. exp. basic arc furn.; broad and varied exp. in melting all types of stainless, tool and constructional steels; can furnish finest of references. Box 11-305.

PLANT SUPERINTENDENT: At present employed by large fabricator of Al parts as supt. of casting, forging and machining depts. Exp. with aircraft mfr. equipping and operating complete plant for stainless steel parts. Box 11-310.

HEAT TREATER: 25 yrs. exp. tools of all kinds; also carburizing and gen. heat treat. Can operate modern furn. all kinds. Cleveland preferred. Box 11-315.

WELDING ENGINEER: 4 yrs. welding consultant, 6 yrs. met. Exp. arc and gas welding and brazing almost all steels and cast iron. Considerable exp. welding and brazing Al alloys and welding Mg. Some exp. flame hardening and ship repair welding. Salary desired $7200. Box 11-320.

METALLURGIST: B.S. and M.S. Met. Eng.; age 26. Exp. in phys. met. problems involved in production of armor plate, shells, bombs, aircraft camshafts. Thorough basic knowledge of phys. chem. Would like position as plant met. analyzing met. problems for mfr. Box 11-325.

METALLURGIST: Desires position in res. or devel. lab. Exp. failure anal., quality and production control, develop. and res. work on metals, rept. writing, proofreading of tech. pub. and specs. Exp. in hardenability determinations by end-quench and by alloying elements. Box 11-330.

RESEARCH METALLURGIST: 5 yrs. exp. met. inspection and control, especially radiography; devel. of specs. and standards for welds and castings. Qualified to supervise complete met. and inspection lab., preferably in a ferrous or non-ferrous foundry. New England or New York pref. but not necessary. Box 11-335.

METALLURGIST: 10 yrs. exp. carburizing, nitriding, cyaniding, heat treat Al, writing of specs., lab. inspection, trouble shooting. B.S. in Met. Box 11-340.

METALLURGICAL ENGINEER: Young, energetic, able. Varied exp. in mech. processing, heat treat, fabrication, quality control, lab. work, both ferrous and non-ferrous. Formerly head of lab. with prominent aircraft mfr. Desires Midwest vicinity and opportunity to show ability and initiative. Box 11-345.

RESEARCH METALLURGIST: M.S. in Met., M.I.T., 1940. Exp. supervision of res. on phase transformations and heat flow in steel; preparation of Army specs. Several publications. Qualified for res. director or supervisor. Box 11-350.

SALES ENGR.: Qualified by exp. to represent ferrous or non-ferrous mill fabricators, metal treating and finishing mfrs., metal protective product makers, instrument mfrs. New York area preferred. Box 11-360.

METALLURGIST AND CHEM. ENGR.: B.S. Chem. Eng. and M.S.; age 30, married. 5 yrs. exp. lab. metallographer and met. dealing with mfr. of turbo-supercharger and aircraft gas turbines. Exp. all phases phys. met., both ferrous and non-ferrous. Supervision of magnetic particle and X-ray investigation. Desires responsible position as met. or lab. supervisor. New York and New England preferred. Box 11-365.

METALLURGIST: B.S. Chem. Engr., age 28. 5½ yrs. exp. steel plant, customer contact work, phys. testing, heat treat and machining ferrous metals, pilot plant, pyrometry, investigational and consulting work. Desires contact work or met. position with promotional possibilities. Box 11-370.

NEW PRODUCTS IN REVIEW

INCONEL WELDING ELECTRODE

The International Nickel Co., Inc.
67 Wall St., New York, N. Y.

A new Inconel welding electrode is suitable for both a.c. and d.c. welding of wrought Inconel, cast Inconel and the Inconel side of clad steel. The new rod is now in production at the company's Bayonne Works and is regarded by engineers as a long step forward in the development of welding electrodes for use with both alternating and direct current. It is of particular importance for welding of Inconel in such fields as chemical and aviation industries, as well as in the general metallurgical fields.

Characterized by improved arcing qualities, simplicity of slag removal, and an ability to make crack-free welds in any thickness, this electrode may be used on either straight or reversed polarity with direct current motor generator sets. Recommended amperages for the new Inconel welding electrode, based upon electrode diameter, are indicated in the following table:

Electrode Diameter	Recommended Amperages a.c.	d.c.
0.075 in.	40 to 50	30 to 40
3/32 in.	45 to 60	35 to 50
⅛ in.	90 to 110	80 to 100
5/32 in.	130 to 150	110 to 130
3/16 in.	150 to 170	130 to 150

Mention R-321 When Writing or Using Reader Service.

UNDERWATER ELECTRODE

Metal and Thermit Corp.,
120 Broadway, New York, N. Y.

Arc-oxygen underwater cutting electrodes, until recently manufactured solely for war purposes, are now commercially available.

The arc-oxygen cutting electrode utilizes the heating properties of an arc flame, ranging from 6000 to 10,000° F., for underwater kindling of steel plate and beams to the burning point. Into the molten steel thus produced, a jet of pure oxygen is produced to cut cleanly through the steel.

The electrode has made possible the amazing speed with which invasion harbors have been cleared of sunken ships by Navy salvage and Seabee forces, and has permitted the underwater trimming and welding of ragged shell and torpedo holes in vessels afloat, enabling them to proceed to drydock for permanent repair. So fast is the underwater cutting process that ½-in. steel plate, for instance, has been cut at the astounding rate of 52 in. per min.

An underwater welding electrode, known as Murex type C W, is also supplied in ⅛ to ¼-in. sizes. For general salvage operation the 3/16-in. size is by far the most widely used and is employed for welding plate from ⅛ in. to heavier thicknesses. The Murex C W electrode also can be used effectively for cutting material up to ¼ in. in thickness.

For cutting heavier steel, the Murex C-T tubular electrode is employed. This is supplied in one size only—5/16 in. O. D. and 0.112±0.008 in. I. D. When in use, oxygen is passed through the opening in the tubular electrode. This method of cutting is faster and less hazardous than any other known method of underwater cutting. Both the Murex C W and C-T electrodes have extruded and waterproofed coatings and are ready for use. Changing of the electrode can be easily accomplished under water.

In tests, the Murex type C-T tubular electrode shows average underwater cutting speeds ranging from 12 to 15 in. per min. for 1½-in. steel plate to 30 in. per min. for ¼-in. steel plate. The maximum underwater cutting speed ranges from 36 in. for 1-in. steel plate to 62 in. per min. for ¼-in. plate.

The tubular steel electrode may also be employed for cutting non-ferrous metals and iron. It may likewise be used in the open air for the cutting of difficult high alloy steels, such as austenitic stainless.

Mention R-322 When Writing or Using Reader Service.

HARNESSING INDUCTION GENERATORS TO DOUBLE POWER OUTPUT

Induction Heating Corp.,
389 Lafayette St., New York 3, N. Y.

By use of the newly developed Coaxial Equalizer, this company is now able to couple two of their standard Model 1070 Thermonic induction generators so that the full output of both can be obtained from a single set of terminals.

Since each of the Model 1070 generators has an output of 1070 B.t.u. per min., full 40 kw. of power is available for use in any desired application with a single control station operating the tandem generator set-up.

The installation of the coaxial equalizer (made up of concentric tubular conductors) is extremely simple, requiring only the connection of the equalizer to the output terminals of the generators. An additional interconnection is made between the power sections of the generators to give electrical stability. The equipment can be operated single phase, two phase or three phase, making it possible to install the equipment from any power supply with the full load power factor at approximately 90%.

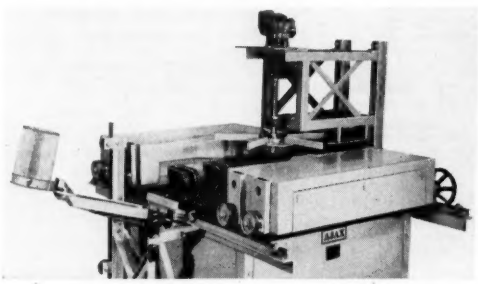
The Model 2200 Thermonic set-up, having an output of 40 kw., can surface harden 8 or more sq. in. of material in a single heating cycle. Its production output can be greatly increased by using progressive heating methods where small sections are heated and the work progressively moved through the heating coil.

Mention R-323 When Writing or Using Reader Service.

MECHANIZED SALT BATH FURNACE

Ajax Electric Co., Inc.,
Frankford Ave. at Delaware Ave., Philadelphia 23, Pa.

A newly designed Ajax-Hultgren salt bath furnace automatically removes baskets laden with small work such as nuts, rivets, screws, grease fittings, washers, links, and fasteners, upon completion of the hardening treatment in the molten salt. The principle of operation is unique in that a specially devised motor-driven mechanism rotates five heat resisting alloy wire baskets through the liquid bath. Each basket remains in the furnace for an identical period



of time, which may be simply adjusted by means of a controlling time switch for any time cycle desired.

Parts to be heat treated may be either manually or automatically loaded into the baskets. A motor-driven transfer arm engages one basket at a time and quickly swings it out of the furnace, emptying the parts into an adjacent quench tank. Baskets may be emptied, returned, reloaded and again charged into the hardening furnace in approximately half a minute. This rapid transferral avoids any appreciable cooling and greatly extends service life of baskets as well as saving on power for heating dead loads.

One user reports that over 500 lb. of small steel fittings are being uniformly heat treated in 1 hr. by this method, requiring only one operator. The equipment occupies only a small fraction of the floor space which would be required for conventional furnaces of the radiation or convection type.

Mention R-324 When Writing or Using Reader Service.

TOOL STEEL

Allegheny Ludlum Steel Corp., Brackenridge, Pa.

From 25% to more than 200% faster machining is provided by a new tool steel, identified as Dunkirk EZ. A free-machining steel, it is described as being "outside the usual tool steel specifications, with extraordinary possibilities in the fields of cold work applications and tool steel machined parts, such as dies, gages, forming rolls, bushings, liners, and bodies for multiple-edge tipped tools."

Dunkirk EZ will harden to about Rockwell C-65 when oil quenched from 1450 to 1550° F.; it may be tempered up to 500° F. without softening under Rockwell C-60; is rather deep-hardening, which assures proper hardness even in large sections; undergoes very slight dimensional change in heat treatment; and possesses high impact and transverse rupture strength. Unusual resistance to wear and abrasion is an outstanding characteristic of this new tool steel.

For special application such as brake dies, Dunkirk EZ can be supplied in the form of bars, blocks, rings, and dies, in the normalized condition at 250 to 275 Brinell; good machinability is still obtained at this hardness.

Mention R-325 When Writing or Using Reader Service.

SEGMENT GRINDING

A. P. de Sanno & Son, Inc.
202 Bridge St., Phoenixville, Pa.

This novel, circular folder discusses Por-os-way Segments and their advantages for surface and face grinding. Rough grinds or precision finishes may be accomplished in most cases faster and more accurately than by using the periphery of straight wheels or by machining. By reducing areas to be finished and employing segmental grinding, savings are made in time, labor and material.

Mention R-326 When Writing or Using Reader Service.

WILSON "BUMBLEBEE" WELDER

Air Reduction Sales Co.,
60 E. 42nd St., New York 17, N. Y.

This new 200-ampere Wilson "Bumblebee" transformer welder meets the need for a high quality a.c. machine of medium capacity, incorporating the latest features for economy in power consumption and high speed, quality welding.

Built-in capacitators make possible power economies up to 35%, reduce power bills and power input, and relieve overloaded transmission and plant feeder lines, making room for additional equipment. The unit is also equipped with a disconnect switch.

Self-contained, the new 200 "Bumblebee" has two ranges of current, the low from 30 to 110 amperes and the high from 90 to 275 amperes. Continuous stepless current control is provided throughout each current range by simply turning the crank on the top of the machine. A full-view scale makes current settings easy to read at all times.

The machine is entirely self-contained and is sturdily constructed for dependable, economical service. All windings are covered with the latest spun-glass fiber, heat-resistant Class B non-inflammable insulation.

Copies of an illustrated leaflet, giving dimensions, operating data, electrical characteristics, graphs showing volts and efficiency and power factors percentages, and other data, are available.

Mention R-327 When Writing or Using Reader Service.

PLATINUM THERMOCOUPLE

Brown Instrument Co.,
Wayne and Roberts Ave., Philadelphia, Pa.

All patent rights to a new platinum thermocouple, providing practical and accurate results in measuring molten steel temperatures, have been acquired by Brown Instrument Co. from the Rustless Iron & Steel Corp.

The thermocouple is described by Brown engineers as a device that when used in conjunction with a Brown Electronik recorder, measures within 45 sec. the temperature of molten steel even when the steel is covered with slag. It has two basic parts, an immersion head, comprising a platinum and platinum-rhodium thermocouple encased in a fused silica tube mounted in a block of graphite, and a handle which is a 12-ft. insulated pipe containing wires leading to the Brown Electronik recorder. In actual operation the immersion head is manipulated through the furnace door where it is dipped into the steel bath. The exposed tip of the silica tube, containing platinum thermocouple wires, is immersed in the steel itself. A rugged graphite block protects the sensitive silica tube against deterioration by slag, mechanical shock, etc.

Mention R-328 When Writing or Using Reader Service.

DRILL ROD

The Carpenter Steel Co.,
333 W. Bern St., Reading, Pa.

To point the way to better results where drill rod is used for small precision tools or intricate parts, this 24-page booklet on tool steel drill rod gives useful information on its selection and heat treatment and complete tables of standard sizes. Designed to simplify the selection of tool steel drill rod and help prevent costly accidents in hardening.

Mention R-329 When Writing or Using Reader Service.

GLAZED COATING INCREASES REFRACTORY LIFE

Brickseal Refractory Co.,
1029 Clinton St., Hoboken, N. J.

A new four-page bulletin just issued describes a refractory coating which is applied to refractory brickwork or plastic refractories by paint brush or spray gun. Composed of high-fusion clays and metal oxides combined in oils, Brickseal fuses under heat to form a highly glazed, monolithic protective coating over the entire refractory structure. It is available in four grades to suit various operating temperatures, as follows:

Grade	Vitrifies at	Max. Temp.
Brickseal No. 1600	1450° F.	2000° F.
Brickseal No. 2000	1900	2600
Brickseal No. 2600	2500	2850
Brickseal No. 3000	2800	3200

Brickseal practically eliminates cracking and spalling of brickwork, stops infiltration of outside air, greatly simplifies the removal of slag and clinker and, by reflecting heat back into the furnace, definitely increases firing efficiency.

Suitable for protection of oil, gas, or coal-fired equipment, Brickseal has for several years been used in all types of boilers, incinerators, industrial heat treating furnaces and similar high temperature equipment.

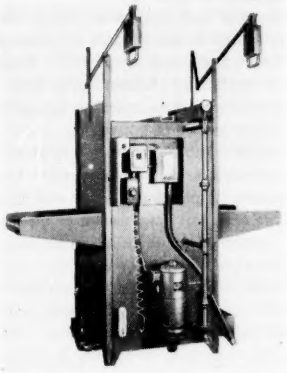
Mention R-330 When Writing or Using Reader Service.

NEW PRODUCTS IN REVIEW

WASH AND RINSE UNIT

Optimus Equipment Co.,
171 Church St., Matawan, N. J.

This single stage washer permits rinsing and washing in one unit. An additional feature is the fact that the unit is portable, permitting it to be easily spotted wherever the work is, eliminating the need of bringing the work to the machine. Furthermore, it can be easily moved on to another spot as the flow of work shifts from department to department.



The unit is small, compact, quick-working and handy, occupying a floor area of only 12 sq. ft. It comes complete with moving jets and easy-operating vertical sliding doors that adequately control splash and spray. It can be equipped with any type heating device and thermostatic control.

Another new product is a line of aluminum precleaner and deoxidizers. Their use promotes low surface resistance on aluminum preparatory to spot welding.

Among the advantages claimed are a smut-free surface, oxide removed using a cold solution, negligible weight loss, minimum machine adjustment and minimum handling. Shop dirt, cutting oil, grease and identification paint are easily and completely removed in the prescribed precleaning operation.

In addition, the aluminum is placed in condition for Alrok treatment, anodizing and painting. With the use of the proper method all classes of alloys are easily handled.

Mention R-331 When Writing or Using Reader Service.

FLASH WELDING MACHINES

Progressive Welder Co.,
3050 E. Outer Dr., Detroit 12, Mich.

Development of an entirely new line of butt-flash welding machines in five standard sizes embodying numerous new design and operating features to provide maximum flexibility as to application, ease of maintenance and operation, safety and reliability, has been announced by this company. The machines range in electrical capacities from 20 kva. to 250 kva. The five basic sizes which comprise this range are classified and rated according to recommended specifications of the Resistance Welder Manufacturers Association.

The design of these machines permits them to be furnished for hand, air, hydraulic or motor operation, as desired. Also, work clamping fixtures can be operated by one method and platen traverse by the same or another method. Thus, work clamping can be air operated and the flash and upset can be hydraulically operated on the same machine without change in the basic design of the machine. According to the nature of the work to be done, a machine may be manually controlled, semi or fully automatic.

Mention R-332 When Writing or Using Reader Service.

BUILT-IN PALLETS ON SKID BOXES

Elwell-Parker Electric Co.,
Cleveland, Ohio.

A well-known and progressive manufacturing company has simplified the handling of metal scrap from machining, stamping and cutting operations by adding what might be termed "built-in" pallets to the conventional skid boxes used to collect this material. With these attached pallets, an Elwell-Parker electric power truck equipped with a swivel mounted fork picks up fully loaded boxes for transport to the loading platform where they are elevated and up-ended for quick dumping of the scrap into street trucks.

Instead of resting on skids in the usual manner, the boxes have false bottoms, open at two ends. A steel plate as long as the box is turned up at a 90° angle for 5 in. at each side of the box. The upper edges of these bent-up sections are then welded to the lower edges of the box, thus forming a trough, or pallet, about 4 in. deep, integral with the box.

In operation, the fork is thrust into the pallet opening, the load lifted and conveyed to the shipping platform. When the box is turned upside down to empty the contents, it is held securely to the fork by means of the bottom plate.

This is accomplished without having to change attachments or interfering with the usefulness of the truck for other handling operations. In fact, the same truck tiers loaded skid boxes five-high whenever it is desired to store the scrap in minimum space awaiting favorable conditions for disposal.

Mention R-333 When Writing or Using Reader Service.

FATIGUE TESTING MACHINES

The Baldwin Locomotive Works, Southwark Div.,
Philadelphia 42, Pa.

Increasing demand for fatigue testing machines that will handle small pieces or sub-assemblies of larger structures has led to the development and production of two new pieces of testing equipment. Special features of these machines will make it possible to approach an actual field test much closer than before. It should be valuable for the testing of automotive and airplane parts or any structural components or specimens.

The Southwark universal fatigue testing machine, which provides a dynamic load application of 20,000 lb. in one direction, is made possible through a hydraulic preloading attachment of 10,000-lb. capacity. The high operating speed of approximately 2000 load cycles per min., at constant force as opposed to constant deflection, gives two important advantages over other machines. Any predetermined alternating load is kept automatically constant regardless of the changes of deflection that may occur in the specimen under test. Other slower speed machines, whose load is applied with eccentric cranks, maintain a constant alternating deflection, regardless of load.

Southwark's other new universal fatigue testing machine of 1000-lb. alternating force capacity also has a static preloading attachment which results in a force capacity of 2000 lb. in one direction. It was developed for tests in tension-compression, bending or torsion. The torsion testing attachments for the latter have a capacity up to 30,000 in.-lb. and permit the testing of specimens exceeding 1 in. in diameter. The standard tension-compression fixture for testing specimens is equipped with tapered collets to grip plain cylindrical pieces. Bending fixtures are available up to 6000 in.-lb. bending moment for testing flat plate specimens up to approximately ⅜ in. in steel, ½ in. in aluminum alloys and 1 in. in plastics.

As in the other new machine, this 1000-lb. tester operates at high speed and may be set for any predetermined alternating load which is then automatically kept constant. An inertia force compensator of very simple construction cancels all inertia forces, and the accuracy of loads transmitted is kept well within ± 2%.

Mention R-334 When Writing or Using Reader Service.

HARDENABLE CU-NI-MN ALLOY

Driver-Harris Co., Harrison, N. J.

Manganese alloy No. 720 is a soft, ductile metal which can be hot or cold formed into intricate shapes and then hardened to a remarkable degree by a comparatively low temperature aging treatment. It differs from many precipitation hardening alloys in that dependable and uniform hardening response does not involve critical control of chemical analysis, fabricating technique, or heat treatment. The high hardness of the heat treated alloy is accompanied by high tensile and fatigue strengths. The designer of severely stressed parts will be especially interested in the high ratio of yield strength and proportional limit to tensile strength.

Although the alloy is more than half copper it has a silvery color and presents an attractive finish when polished. It is corrosion resistant, and in this respect it does not differ greatly from the familiar cupro-nickels.

The alloy has nominal chemical analysis of 60% copper, 20% nickel, and 20% manganese. The copper, nickel and manganese used are all electrolytically produced. Unlike many precipitation hardening alloys, hardening does not depend on the presence of a relatively small quantity of an element producing a variable second phase or compound. In contrast, the aging is characteristic of a wide range of alloys of the general composition given, and there are no critical limits which must be held to assure uniformity in hardening.

Available in all commercial shapes, this soft, ductile alloy is particularly adapted for use in springs, diaphragms, and other parts in which design requirements make it desirable first to shape the part and then heat treat it to attain the desired hardness and tensile and fatigue strength. Since 720 alloy has a modulus of elasticity of 18 x 10^6 when soft annealed, and 21 x 10^6 in the heat treated condition, a spring which has been hardened and does not meet specifications may be brought within limits by further heat treatment.

Mention R-335 When Writing or Using Reader Service.

CLEAN, BRIGHT BRASS CLEANER

The Cowles Detergent Co.,
7016 Euclid Ave., Cleveland 3, Ohio

The latest development of Cowles research dept.—KW clean, bright brass cleaner—can be used in still tank (with or without electric current) and in washing machine equipment. KW cleans bright and does not attack or tarnish the metal; it is also adaptable to cleaning die castings.

Mention R-336 When Writing or Using Reader Service.

SNAP GAGE

Federal Products Corp.,
1144 Eddy St., Providence 1, R. I.

This new snap gage takes the uncertainty out of the conventional "feeler" type of snap gage. It visualizes the actual dimension of the workpiece. It has all the simplicity, compactness and utility of the snap gage with the addition of defining positively that there is a variation in the specified dimension; in addition it tells how much the dimension varies.

This new visual Model 1340 snap gage magnifies impersonally and mechanically all dimensional variations. It fits the hands comfortably and is handled in an entirely natural manner.

It is a single-purpose type of gage, the dial of which is graduated in 0.0001 in.; it has a range of 0.008 in., and can be made to suit any dimension between ⅛ and 1½ in. It weighs only approximately 7 oz.

Weight of the gage rests on the rigid upper anvil. Therefore, it cannot influence the indicator reading. The lower anvil is a flexible, solid piece of metal which transfers the variation in the dimension from the workpiece to the dial indicator. Both anvils are tungsten carbide tipped for long wear. It has an insulating finger grip.

Mention R-337 When Writing or Using Reader Service.

"THREE-WAY" BENCH FURNACE

Surface Combustion Corp., Toledo 1, Ohio

Designed to fulfill the requirements of a wide variety of applications, a new "three-way" bench type universal laboratory furnace is now available. Controlled operation over a wide range of temperatures further enlarges its field of use.

The furnace combines three different types of furnaces in one casing. It may be used as a direct-fired oven unit at temperatures from 300 to 2400° F. For direct heating a muffle can be placed on the hearth. If an atmosphere is desired a diamond block can be used in the muffle. A removable plug built into the arch of the furnace provides a means of inserting a pot.

This laboratory furnace is ideal for small shops or laboratories where a wide variety of heat treatments in relatively small quantities of small parts must be performed. Such operations as annealing, carburizing, hardening, cyaniding and tempering, with or without a furnace atmosphere, can be handled by the one furnace. It functions as a direct-fired oven, indirect heated muffle, gaseous atmosphere, salt or lead bath type and may also be used for melting soft and light metals such as tin, lead, aluminum, or magnesium.

The furnace is equipped with three atmosphere-type gas burners, each of which can be independently controlled. The burners are arranged under the hearth to provide uniform and rapid heating throughout the heating chamber. A gas pressure regulator assures uniform control of burner operation. Fuel under low pressure without air under pressure is sufficient for burner operation, such as manufactured or natural gas at 3 to 6 in. water pressure or butane or propane at 9 to 11 in. pressure.

Mention R-338 When Writing or Using Reader Service.

LATHE FILE

Kennametal, Inc., Latrobe, Pa.

Development of a new lathe file that retains the advantages of previous models in that it will cut steels no ordinary file will touch, at speeds three to ten times faster than possible with steel files, with a life of 50 to 200 times as long, and in addition provides longer filing surface, quick, easy blade replacement, and greater handling convenience, is announced by this company.

In this new design, the Kennametal blanks have brazed-on nuts, and are attached to the aluminum alloy handle by screws. They can therefore be readily replaced when worn from long service. Two types of blanks—fine (30 teeth per in.) and coarse (20 teeth per in.) are available, and are interchangeable on the same handle. The handle grip is shaped to fit the hand, and has a thumb rest and knuckle guard. An extension beyond the filing surface supplies a convenient finger hold. A hole in this extension permits the file to be hung up.

One size is now available—the F-45, 13½ in. long overall—with a filing surface ¾ in. wide by 8 in. long, comprising two ¾ x4-in. Kennametal blanks. Notwithstanding its new and distinctive features, this file is available at the same price as the previous model.

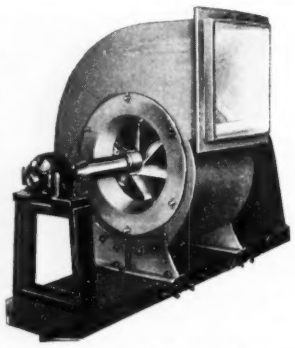
Mention R-339 When Writing or Using Reader Service.

NEW PRODUCTS IN REVIEW

HIGH TEMPERATURE FANS

Michiana Products Corp., Michigan City, Ind.

A line of high temperature heat resistant alloy fans is designed especially for handling hot gases or products of combustion in heat conservation systems in industrial plants; for annealing, hardening, drawing, stress relieving, galvanizing, tin plating and many other types of furnaces, as well as for soaking pits and the like where temperature requirements range as high as 1800° F.



These fans provide controlled recirculation, utilized to hold furnace temperatures within close limits, and also provide the flexibility required in "program" heating and cooling. They embody novel principles of design and construction, and are capable of operating successfully at temperatures up to the limit of the heat resistant alloys used in their construction.

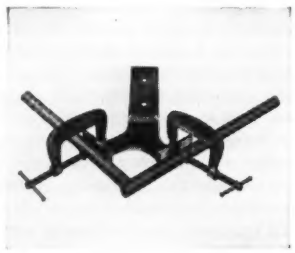
Construction eliminates the use of screws, bolts, rivets and welds. The vital operating parts are so assembled that they are free to expand and contract independently of each other radially and axially, thus avoiding distortion and unbalancing of fan wheel. These fans are available with double or single inlet wheels and can be made of any castable alloy to meet requirements; they are not limited to materials produced in rolled form.

Mention R-340 When Writing or Using Reader Service.

WORK HOLDING CLAMP

McFerron-Myers Products,
1401—308 Euclid Ave., Cleveland 14, Ohio.

Designed to hold parts squarely for welding, soldering, cementing, gluing, nailing, and other fastening operations, this Duo-Square jig or clamping device is available in three models. Straight type is for butt joining; micro-justable, for joining at odd angles; and square, illustrated, for right-angle joining. All three will be available in sizes necessary to meet a wide range of requirements.



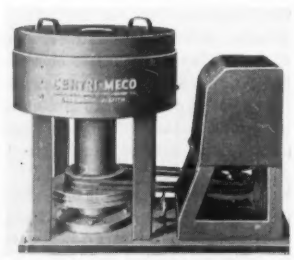
The Duo-Square jig or clamping device can be employed for joining tubes, bars, flats, and other elements into perfect alignment or at selected angles. Work holders are machined accurately and have grooved faces for holding tubes, rounds and odd shapes. Jigs can be used in multiple for complex assemblies.

Mention R-341 When Writing or Using Reader Service.

CENTRIFUGAL CASTING MACHINE

Centrifugal Machine & Engineering Co.,
679 Jackson Ct., Kalamazoo 7, Mich.

Experience of the past few years has created an increasing demand for centrifugal castings, primarily because such castings can be made to closer tolerances, and in some cases cast to size. It is claimed that centrifugal castings are sounder and have higher physical properties, because when the process is followed through correctly there will be no hidden defects, such as gas pockets, porosity, etc., which might show up at some later time.



This new Centri-Meco centrifugal casting machine, which features the Miracle-Hub (a trade name) has been designed to be heat-free in the bearing area during continuous use of the machine with permanent molds attached directly to the heavy table mounting-plate. This new type hub is said to be so constructed that the temperature in the bearing area never exceeds 125° F.

The heavy table has four strut-vanes which act as a fan to carry away the excess heat that is radiated above the top bearing. The joining of the strut-vanes to the hub is made by rigid welded construction to provide great strength at this vital point. It is also claimed that this type of construction permits four relatively small points of contact to make their junction with the hub, and thus a smaller area of conductivity of heat results. This strut-vane type of construction also adds greater strength against any possible table distortion.

The machine is mounted on heavy plates for anchoring to the floor. The hub is turned of 6¾ in. mechanical tubing of ¾ in. wall. The table mounting-plate is 18 in. diameter and the heavy-plate base is 20x42 in. Two anti-friction bearings are employed in the Miracle-Hub construction. Double V-belts are used to drive the table. Motor mounting is made of heavy 2x2½ in. angle. It is adjustable into standard belt lengths permitting minimum to maximum obtainable machine speeds. Motor is adjustable up and down for alignment of sheaves.

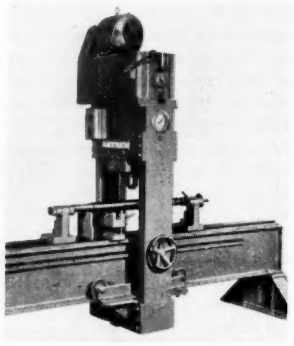
Mention R-342 When Writing or Using Reader Service.

HYDRAULIC STRAIGHTENING PRESS

Anderson Bros. Mfg. Co., Rockford, Ill.

To facilitate the loading of heavy work in straightening presses, the company has developed a new power hydraulic press shown in the illustration.

With the traveling ram at one end of the press, the crane can lower heavy work into place on the machine and then the traveling ram can be placed over the work wherever required.



The traveling ram rolls on four ball bearing equipped wheels and the balanced ram assembly rolls with remarkable ease. The table is equipped with V slide on which are mounted spring loaded centers and checking rolls.

The Anderson indicator shows: (1) The amount of runout; (2) where to stop the shaft and do straightening; (3) during the pressure operation, it tells the operator how much he is bending the shaft; (4) as soon as the pressure is released it tells him what happened on the first straightening "try" and gives a guide for the next operation.

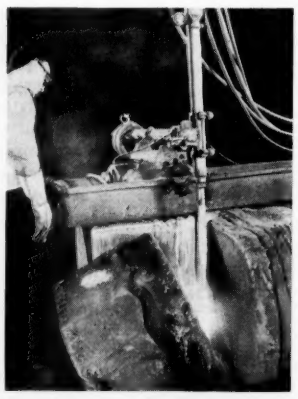
The bed is a welded structure 11 ft. long; however, the length can be made to suit customers' requirements. The capacity of this particular press is 50 tons or 100,000 lbs.

Mention R-343 When Writing or Using Reader Service.

HEAVY DUTY CUTTING BLOWPIPE

The Linde Air Products Co.,
30 East 42nd St., New York, N. Y.

A new heavy-duty, oxy-acetylene cutting blowpipe, the Oxweld C-45 machine-cutting blowpipe, cuts steel ranging in thickness from 16 to 50 in., and is particularly suited for hot top cutting, ingot slitting, riser cutting, large forgings, and scrap cutting in many uses formerly requiring the oxygen lance.



The C-45 is water cooled and is intended to be mounted on a heavy-duty, straight-line cutting machine. A 50-lb. gage is attached to the blowpipe body for checking cutting-oxygen pressures which are unusually low—never over 35 psi. The C-45 blowpipe is designed for operating with medium-pressure acetylene and will operate satisfactorily on a generator or a manifold having a minimum hourly capacity of 500 cu. ft. of acetylene. Unless cutting oxygen is supplied from a pipe line, at least ten cylinders should be manifolded to provide sufficient capacity. In shops where steel over 18 in. thick must be cut frequently, the C-45 blowpipe provides a tool for making these cuts quickly and economically.

Also available is the Oxweld C-45 blowpipe holder, which has been designed especially for this blowpipe. It provides ease, accuracy, and stability in making vertical and angular adjustments. Vertical adjustment is obtained by turning a ball crank which operates a worm and gear that meshes with the blowpipe rack. A total angular adjustment of 135° can be obtained in the plane of the cut.

Mention R-344 When Writing or Using Reader Service.

COOLANT AND CUTTING OIL STRAINER

Strainer Products Corp.,
75-77 N. Willow St., Montclair, N. J.

This new type of non-clogging coolant and cutting oil strainer for easy installation on grinders, lathes and other machine tools, known as Metex Model G, provides cleaner fluids and longer periods of uninterrupted strainer service. Preventing chips or particles from being recirculated in the fluids, the strainer units help avoid scoring or other defective work in machine operations.

Constructed of knitted fabric and wire, made into strong, non-collapsible rectangular units with unusually high strainage area, the composite honeycomb mesh is fine enough to catch dirt, grit and chips, yet provides ample free area for the passage of cleaned fluids.

Designed for installation submerged in the machine tool sump tank or in a separate tank on the pump intake, Metex Model G is available in six sizes, surface straining areas and capacities. They are made with three or six individual straining elements which feed through a plenum and are interchangeable as to length. Clean strainer refills can be installed in the secure slots in a matter of minutes, and the old ones washed out for another long period of service.

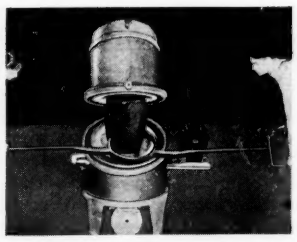
Mention R-345 When Writing or Using Reader Service.

CRUCIBLE DRAW FURNACE

Fen Machine Co., 1364 Babbitt Rd., Euclid, Ohio.

The unique design of the Iler crucible draw furnace insures several distinct advantages in non-ferrous foundry operation. Constructed of heavy gage steel, the furnace is divided, on an inclined plane, into two parts, hinged at the back. The lower section contains the burner. A closed passage, built into the wall of the lower section, conducts the air from the blower to the burner. Traveling through this passage, the air picks up heat which would otherwise be lost, returning to the combustion chamber.

Thus preheated, this air facilitates combustion, resulting in a short flame, retained down and around the crucible. Only a minimum is allowed to escape through the port in the cover. Tests show that this preheated air effects a saving of 20% in natural gas and a correspondingly greater saving where fuel oil is used to heat the crucible.



Raising or tilting the upper part of the furnace allows quick, easy access for charging or removing the crucible. As shown in the illustration, no tongs nor overhead handling equipment are required. The special, open-side shank provided with the furnace makes for easy handling, allowing direct pouring. Overheating and transfer of metals is eliminated. The extra cost of heating and maintaining other receptacles is avoided. Since no tongs are required, no pressure is exerted on the crucible shell, eliminating the danger of crushing the crucible and assuring longer crucible life.

No pit is necessary as the Iler furnace is mounted on legs which allow ample space beneath the furnace body for the air lift mechanism. An automatic air lift, recently added, opens and closes the furnace at the touch of a valve. The valve may be located at any convenient point near the furnace, within easy reach of the operator.

Mention R-346 When Writing or Using Reader Service.

PRESSED METAL EMBLEM

Pressed Metal Institute,
Union Commerce Bldg., Cleveland, Ohio.

The adoption of an emblem for use in advertising and direct mail by members of the Pressed Metal Institute is announced by F. C. Greenhill, president. The emblem is available to members in various sizes adopted to the widest possible use by the industry. This emblem which incorporates the slogan "Advance with stampings" is designed as a stamping, and will serve to coordinate individual company advertising in the interests of the pressed metal industry and the Pressed Metal Institute. It will identify companies cooperating in an industry-wide organization to increase the use of stampings.

The Pressed Metal Institute believes that it is especially important at this time that every effort be made to advance the art of stamping and to assist manufacturers, designers and engineers to take full advantage of the latest stamping methods and techniques. It is expected that stampings will play an even more important role in the production of civilian postwar goods than they played in the production of war material.

Mention R-347 When Writing or Using Reader Service.

NEW PRODUCTS IN REVIEW

CHART DRIVE CUT-OUT

Brown Instrument Co., Philadelphia, Pa.

This chart drive control offers a means for automatically starting and stopping electronic recorder chart motion by pen position. The chart drive cut-out will be available for Brown's circular chart Electronik recorder. Control contacts are wired in the chart drive circuit. By setting the control point the chart can be stopped and started as desired, corresponding to any pen position.

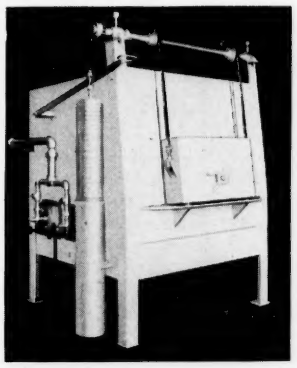
The new feature will find its greatest usefulness for molten metal thermocouple and radiation pyrometer applications.

Mention R-348 When Writing or Using Reader Service.

BATCH FURNACES

W. S. Rockwell Co.,
50 Church St., New York 7, N. Y.

This complete line of standard oven or hearth type batch furnaces may be gas or oil fired or electrically heated. Range of heating for gas or electric types is between 600 and 1800° F.; for the oil-burning type 1200 to 1800° F., for such operations as annealing, bluing, carburizing, hardening, normalizing, drawing and stress relieving.



These furnaces are made with reinforced steel shells, lined with refractory and insulation to meet the most severe heating conditions with minimum heat absorption and heat losses. A cast iron, insulating-refractory-lined inclined door makes a tight heat and atmosphere seal and is easily operated by a hand lever. A smaller inspection door is bolted to it to permit charging and removal of small pieces or inspection.

The hearth of fuel-fired furnaces is of carborundum with ledges extending above both sides and rear to form a semi-muffle. Electric furnaces have a chromium-nickel alloy hearth with upturned ledges. Ample distance between the hearth and the front and rear of furnace assures more uniform temperature over the working area.

In gas-fired furnaces, automatic proportioning equipment is used for single valve control, with Rockwell multi-port alloy steel tunnel burners, firing from both sides of the furnace. By use of double manifolds and Rockwell Hy-Lo gas burners, the operating range may be extended to as low as 600° F., and as high as 2200° F.

In the oil-fired furnace (illustrated) Rockwell oil burners, which may be manually or automatically controlled, permit a wide turn-down range to assure minimum fuel consumption and temperature variation at the desired operating temperature.

In electric furnaces, Nichrome wire resistors are suspended from the arch and mounted under the hearth (as well as at the sides in larger furnaces). These individual type heating elements are easily removable, without disturbing the remaining elements.

These furnaces are available in 18 hearth sizes from 12 in. wide x 18 in. long to 48 x 96 in., to meet virtually every batch heating requirement, broad enough for load capacity from 50 to 1070 lb. per hr. at 1500° F. They may be equipped with doors at both ends, muffles, flame curtain, special rollers or rails for carburizing boxes or trays, cooling chambers, quench tanks and other special equipment to meet specific requirements.

Mention R-349 When Writing or Using Reader Service.

POWER BRUSHES USED TO REMOVE SILVER FROM DIALS

The Osborn Mfg. Co.,
5401 Hamilton Ave., Cleveland, Ohio.

Power brushing as a means of removing silver from watch dials following plating is enabling manufacturers to complete this operation in one-sixth the time formerly taken and to produce a better quality of workmanship, it is said. Power brushing removes the excess silver from the dial without defacing or removing metal from raised numbers or other designs and figures. Sand blasting, wire buff or emery paper previously used took approximately 3 min. per dial, while the new operation is now completed in ½ min.

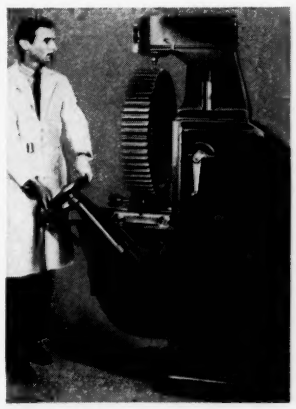
The brush used is 8 in. in over-all diameter with an inside diameter of 3¼ in. and Tampico fiber sections approximately 17/32 in. in thickness. The dials are applied to the brush which is bench-mounted and the buff revolves through a mixture of pumice and water.

Mention R-350 When Writing or Using Reader Service.

HARDNESS TESTER

Clark Instrument, Inc., 10200 Ford Rd., Dearborn, Mich.

The manufacturers of the Clark hardness tester for "Rockwell" testing announce the production of a new model to handle large or cumbersome parts. This new hardness tester also gives a true "Rockwell" reading, using either a diamond or steel ball penetrator, both furnished as standard equipment with the machine. The outstanding feature of the new model is its capacity. It can handle parts ranging from ½ to 26 in.



Provision is made for raising or lowering the table by means of a hand crank. Position of the capstan, mounted on the side of the machine, may be adjusted in relation to table height. Heavy parts are loaded onto a roller bearing carriage on the table, providing an easy method of positioning them under the tester.

Readings are taken exactly as with the ordinary "Rockwell" tester. By means of the capstan the indicator is set at zero on the minor loads. The major load weight is released and a direct hardness reading is taken from the indicator.

Mention R-351 When Writing or Using Reader Service.

SPRAYED REFRACTORY COATING

Basic Refractories, Inc., Hanna Bldg., Cleveland 15, Ohio

Zircoat-M is a zirconium silicate base refractory, which upon application with a spray gun, sets up rapidly to form a hard, dense working surface that will withstand high furnace operating temperatures and unusual furnace conditions. It is a fine-grained material shipped dry in 100-lb. bags. Zircoat-M is mixed with water for spraying and has been extensively used as a protective coating on silicon carbide, fireclay, sillimanite, mullite, silica and other acid type refractories.

Zircoat-M has been widely used with success in the industrial boiler field in protecting brickwork that is exposed to severe flame impingement and corrosive action of clinker or fly ash. Applications of from ⅛ to ¼ in. on the inside brickwork of marine boilers have increased the continuous operation of such units between repair lay-ups from two months to six and eight months.

The aluminum industry has found, through the use of a sprayed application on the sidewalls of melting furnaces, that Zircoat-M not only increases by one-third the life of the brickwork, but also cuts the cost of cleaning the sidewalls of the dross accumulation. The material is not wetted by the aluminum and, therefore, allows considerably easier freeing of dross.

Mention R-352 When Writing or Using Reader Service.

PARTS CLEANING MACHINE

Park Chemical Co., 8084 Military Ave., Detroit 4, Mich.

A portable type parts cleaning machine agitates the cleaning fluid by air pressure. No heat is required in this new Parko unit to remove grease, grime and carbon from machined parts, castings, gears, electrical parts, instruments, or tools.

Two systems of cleaning are combined in the one unit. Large parts are placed in the tank and the cleaning solution is agitated by means of air pressure. The air is dispelled from a series of holes in a pipe which runs lengthwise at the bottom of the tank. Small parts such as screws, washers, etc. are placed in the round basket and soaked in the solution for a few minutes. The basket can be revolved or swished by hand. After the parts have been cleaned, the rack is placed on an attached drain-shelf which drains the solution back into the tank for re-use. Parts are then blown dry by means of the air gun and rinsed with water or petroleum spirits.

It is only necessary to attach this machine to the air-pressure line and it is ready to operate. There are no mechanically moving parts and no electricity is necessary. Only 1 cu. ft. of air per min. is required, and it operates with as little as 20 to 25 gal. of cleaning fluid. The unit is 36 in. high, tank depth 18 in., tank length 35 in., and tank width 17 in. Included as standard equipment are the basket, metal rack for the bottom of the tank, air agitator and air gun with 5 ft. of hose.

Tank-Solv, the new cleaning solution, was compounded especially for use with this machine. This new formula is of the non-evaporating type and it is reported by users that 50% savings are effected. The solution can be used repeatedly, for it cleans by a physical action thereby allowing all grease and grime to settle immediately to the bottom of the tank.

Mention R-353 When Writing or Using Reader Service.

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The Metals Review, November 1945

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Stainless Steel Sheets

Eastern Stainless Steel Corp., Baltimore 3, Md.

In an attractive, case-bound 96-page handbook, extensive information on stainless steel sheets is presented by this company. First 34 pages are devoted to a pictorial review of the importance of stainless steel in such industries as transportation, architecture, food handling, hotels, dairies, chemical processing and paper manufacturing.

An informative section titled "Why Stainless Steel Resists Corrosion" discusses the ability of stainless to readily form an oxide film which acts as a constant buffer against further corrosion of the underlying metal. At least a page is devoted to each Eastern stainless grade, with appropriate applications of each type. Extensive data on gages, sizes and tolerances, finishes, and a complete section on processing and fabrication are supplied.

One of the most interesting and valuable features is a four-page "turn-out" spread giving complete details on properties. There is a fine selection of general reference tables. The catalog was written by Henry Schaufus, Eastern's chief metallurgist, and was designed and produced by the company's advertising agency, the John Mather Lupton Co. Copy may be obtained through the Reader Service Coupon.

Mention R-354 When Writing or Using Reader Service.

High Pressure Die Casting

H. L. Harvill Mfg. Co., Los Angeles, Calif.

"High Pressure Die Casting, A Design Guide for Engineers" is the title of this book which emphasizes the design aspects of die casting rather than presenting only the analysis of the end use of parts produced by this method. In the first 20 pages, the process of die casting and metals used are clarified for the sake of readers who may have no previous knowledge of or experience with die casting techniques.

The balance of the text emphasizes the types of die casting dies and their varying degrees of complexity, the relationship of casting design to die design and, with this material as a foundation, the text then goes into a comprehensive discussion of the important elements of correct design of parts to be produced by the die casting method.

Considerations such as draft or taper on all surfaces of the casting, the effect of sectional variation on metal shrinkage and upon the finished product, the use and correct design of hubs and bosses, the practicability of die cast threads and the use of cast-in inserts are all covered in the text and each subject is fully illustrated. For the first time a comprehensive and usable chart of tolerances is given.

An entire chapter is devoted to a discussion of pressure mold or premium quality die castings with particular reference to recent specifications wherein mechanical properties far higher than any previously adopted by the industry are provided. The book deals with some of the simplified methods of machining die castings, as well as discussing the finishing and inspecting of die cast parts. Twenty-five typical die castings are discussed covering a wide variety of metals used and types of castings produced with an explanation of the use of the part and those elements of its design which made it a successful die casting. A complete glossary of die cast terminology is included.

This book is indexed, cloth-bound and priced at $5.00.

Authors are H. L. "Red" Harvill, president of the H. L. Harvill Mfg. Co., and Paul R. Jordan, industrial consultant. The book may be ordered direct from the company or with the Reader Service Coupon but if the latter is used it should be accompanied by check or money order in the amount of $5.00.

Mention R-355 When Writing or Using Reader Service.

Contour Saw Chart

Capewell Mfg. Co., 60 Governor St., Hartford, Conn.

Printed on heavy cardboard, this handy contour saw wall chart lists 52 materials, the tooth to use for various sizes, and speeds recommended. Can also be used in straight sawing with hard edge flexible metal cutting band saw blades. Similar information is shown on skip tooth band saw blades.

Mention R-356 When Writing or Using Reader Service.

Oven Furnaces

W. S. Rockwell Co., 50 Church St., New York 7, N. Y.

Four new bulletins comprehensively describe oil and gas fired and electric oven furnaces. Booklets show operating pictures of many furnaces. Applications are listed and advantages cited. A 12-page booklet discusses "Kleenmetal" oven furnaces which may be used with protective atmospheres. Temperatures range from 600 to 1800° F.

Mention R-357 When Writing or Using Reader Service.

Zinc and Zinc Alloys

White Metal Rolling & Stamping Corp.,
Brooklyn 22, N. Y.

Whitex zinc products represent the first large scale venture into the extrusion of zinc and its alloys, and while commercially pure zinc has been available in rolled rods, no alloy products have been previously produced. This 4-page folder outlines the products available and includes extrusion tolerances and limits, grades and alloys produced, physical properties, weight table for rods and bars, and briefs on machining and finishing.

Mention R-358 When Writing or Using Reader Service.

Magnesium Castings

Superior Bearing Bronze Co., Inc.,
140 Banker St., Brooklyn 22, N. Y.

An eight-page leaflet discusses the machining of magnesium castings, covering tools required and cutting fluids. When distortion occurs it may result from excessive heating or improper chucking. Finishing is discussed with presentation of methods of corrosion prevention and cleaning.

Mention R-359 When Writing or Using Reader Service.

Lead-Lined Fittings, Valves

American Smelting & Refining Co.,
Lead Products Div., 120 Broadway, New York 5, N. Y.

Three technical bulletins describe expanded lead-lined steel pipe and fittings, lead and lead-lined valves; and prefabricated lead fittings. Contents are technically prepared and very little of the information has been previously available.

Mention R-360 When Writing or Using Reader Service.

Welded Steel Products

Cleveland Welding Co.,
W. 117th St. at Berea Rd., Cleveland 7, Ohio.

An eight-page leaflet illustrates many types of welded fabrication and facilities for this production. Included are gear ring blanks, flame cut gears, motor and generator frames.

Mention R-361 When Writing or Using Reader Service.

Welding Accessories

Air Reduction Sales Co.,
60 E. 42nd St., New York 17, N. Y.

An up-to-date 16-page price list and catalog of Airco gas welding and cutting supplies and accessories contains illustrations, descriptions, engineering data, and current prices. Types of equipment covered include welding rods, brazing and welding flux, hose, brazing alloys, goggles and spectacles, gloves for gas welding and cutting, and sparklighters and tips. Also listed are carbon rods and plates, hard facing rods, cobalt borium inserts, pea borium, and other items.

Information concerning properties and uses accompanies each article listed. Wherever possible, precise quantitative data are supplied. Numerous photographs and sketches supplement the text.

Ordering is facilitated by the listing of sizes and stock numbers in easily read columns. Complete directions for ordering are included. The booklet also lists the addresses of Airco offices throughout the country, from which these gas welding and cutting supplies can be supplied promptly.

Mention R-362 When Writing or Using Reader Service.

High Speed Grinding

Electro Refractories & Alloys Corp.,
Vars Bldg., Buffalo 2, N. Y.

More than a catalog, this 64-page handbook presents the newest information on the use of cut-off and other high speed grinding wheels. Illustrated in four colors, this is an authoritative text on techniques developed during these five years of unprecedented progress in speed and precision. It is the very latest grinding manual.

Mention R-363 When Writing or Using Reader Service.

Precision Control

Toledo Scale Co., Toledo 12, Ohio.

Colorful 20-page brochure shows many of the ways in which equipment for weighing, counting, testing and force-measuring has been applied in solving vital production problems. Pictured for the first time are Toledo scale installations for force-measurement in wind tunnels, dynamometers for test of engines, scales for sorting, testing, balancing, etc.

Mention R-364 When Writing or Using Reader Service.

Corrosion Protection for Cadmium and Zinc

United Chromium, Inc.,
51 E. 42nd St., New York 17, N. Y.

Announcement is made of a new process, Unichrome Dip, offering a convenient and economical means of obtaining corrosion protective coatings on cadmium and zinc. By converting the surface to chemically inert compounds, either black or olive drab finishes can be produced which prevent the formation of white corrosion products and also provide an excellent base for paint or lacquer.

An outstanding advantage is that parts require only a single immersion in Unichrome Dip, for from 2 to 5 min. Other advantages are that no special equipment, racking or current is required; parts are handled in bulk and treated at room temperature; maintenance and control of the solution is both easy and inexpensive. In addition to being a quick, low cost process, coatings produced in Unichrome Dip offer an unusual degree of protection, preventing the appearance of white corrosion products under the standard salt spray test for periods up to 200 hr. Descriptive four-page folder is available.

Mention R-365 When Writing or Using Reader Service.

Lubricating System

The Farval Corp., Cleveland, Ohio

Advantages of the centralized lubricating system when installing machine equipment for postwar operations are pointed out in an illustrated four-page folder, "When you Reconvert". Basic facts are set forth in a compact summary showing how the Farval system operates, with statements of specific results attained through its use.

As an example the folder points out that one oiler per shift formerly was required to lubricate a large machine. Installation of the Farval system not only released the three for other work, but in addition reduced oil consumption from 6 gal. to 1 pint per day.

Bearing replacements for two 30-ton cranes which formerly amounted to $800 in six months have been eliminated, along with a dangerous job for the men who worked on the cranes. Production from one large press was increased 12% by eliminating a shut-down every 4 hr. to lubricate by hand. At the same time maintenance cost was reduced 75% through elimination of bearing repairs.

A cut in rejections saved more than $500 per day by reducing the wear on roll-necks of a 3-high plate mill. A saving of 10% in power also was attained through improved lubrication.

The system delivers measured amounts of oil or grease from a central supply unit to the farthest bearing surfaces, at any predetermined interval. It consists of a central pumping unit, two main supply lines and a measuring valve for each bearing.

The complete range of Farval systems, including both manual and automatic types for a wide variety of industrial equipment, is illustrated.

Mention R-366 When Writing or Using Reader Service.

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